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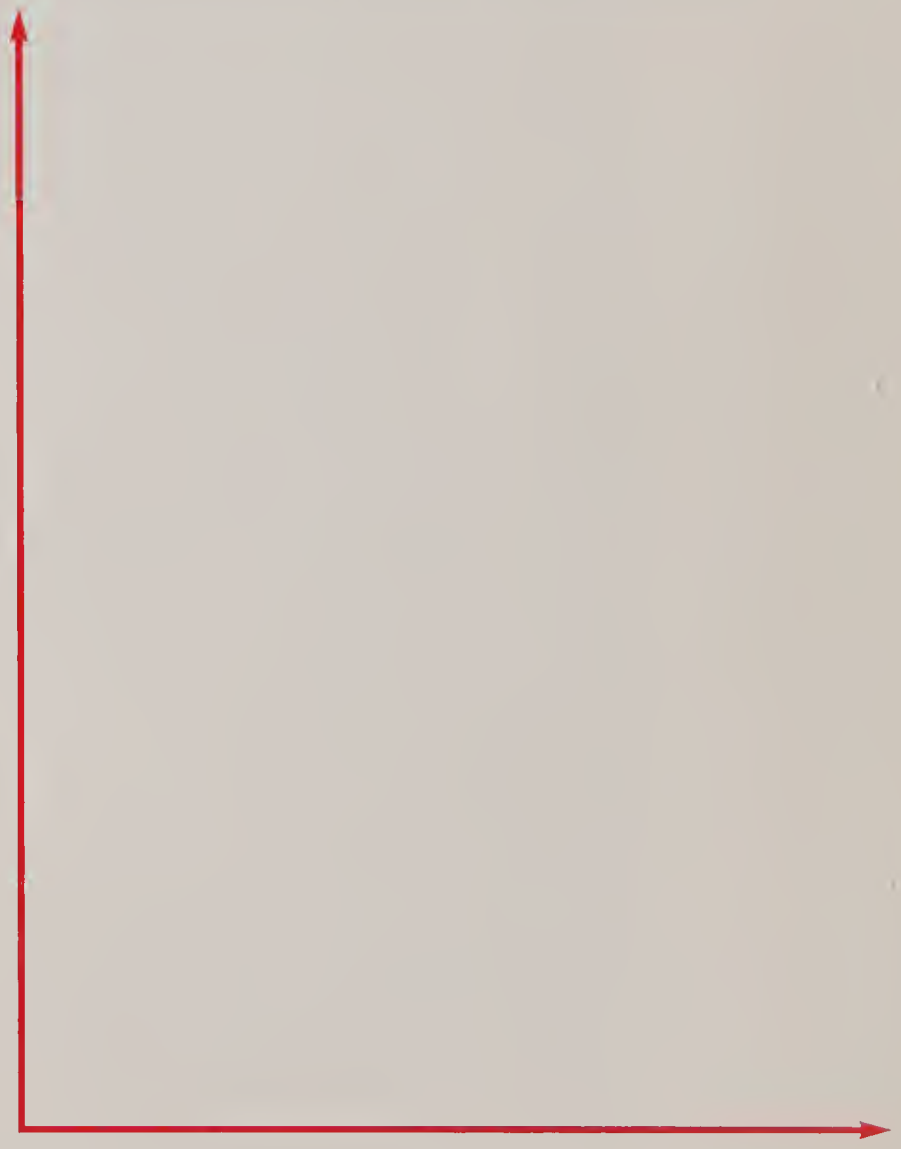
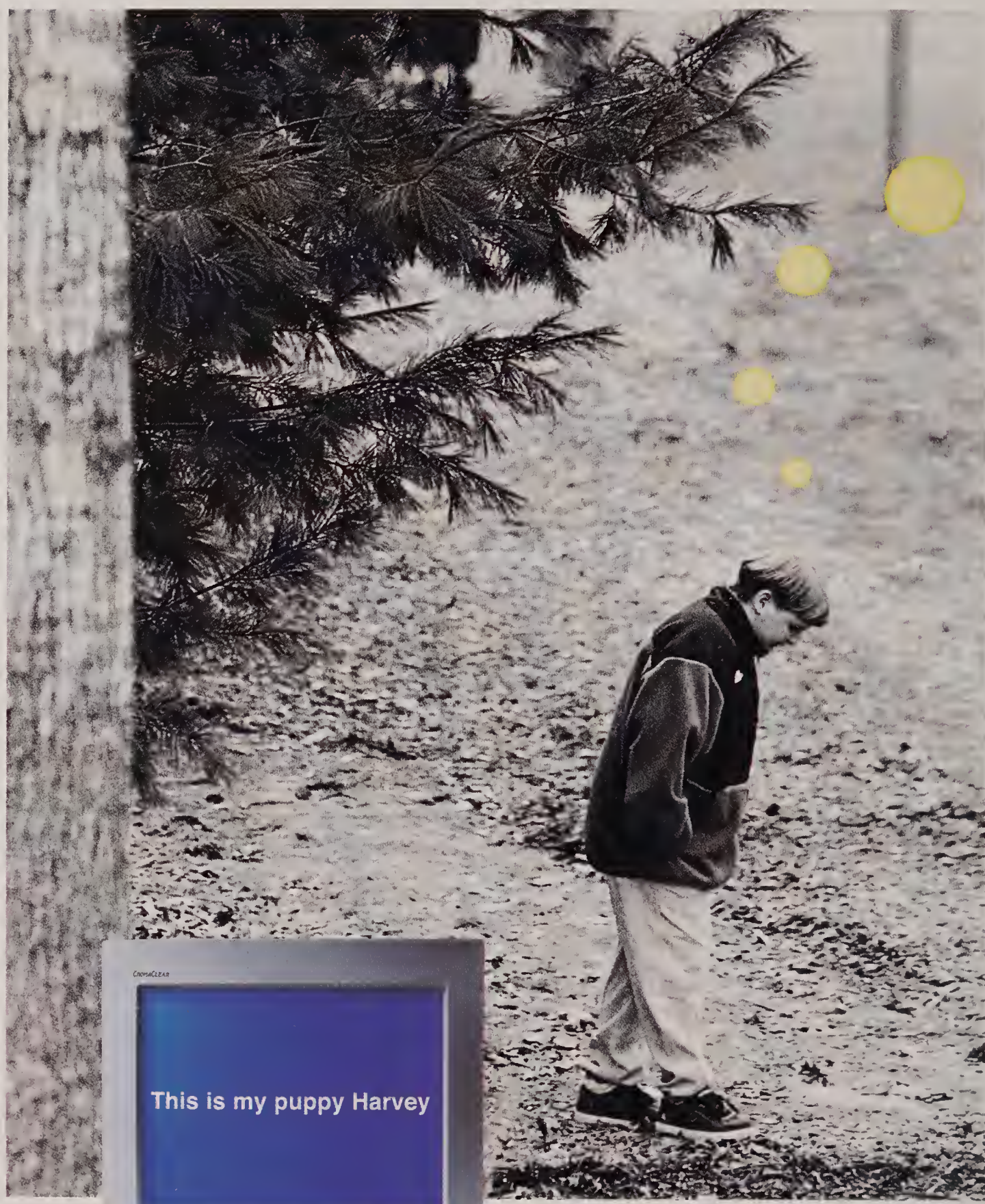
Christian Murphy was non-verbal.
He lived with a wall between himself and the world.





1 THIS IS CHRISTIAN.

He can see, hear, feel, touch, but he cannot speak. He was born with autistic tendencies that cut him off from the world around him.

Until he found this window.

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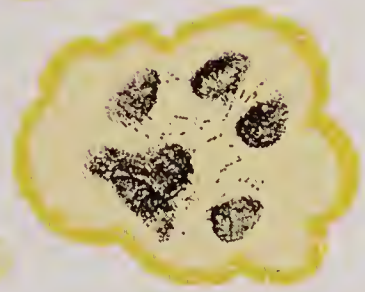

2 A TEACHER DISCOVERED *that Christian would respand ta images from his life. She put visual cues ta the story of his new puppy on a special keyboard.*

3 THE MONITOR BECAME HIS VOICE. *With it he makes class reports and canversatian. With it, Christian, 11, has been in the regular Osterville, MA public school since first grade.*

4 WITH THE PICTURES, HE MADE SENTENCES. *With the sentences, he made friends. Christian's monitar is the window between his non-verbal world and the speaking world of his friends. Thraugh it, he teaches them many things.*

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E500	1280 x 1024 @ 65Hz	119MHz	CROMACLEAR	0.25mm mask
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Word Processor Features	Corel® WordPerfect® 8	Microsoft® Word 97
Support for Intel MMX™ Technology	✔	no
Libraries		
Clipart	10,000+	3,000+
Photos	250	140+
Interface		
Shadow Cursor	✔	no
Tile documents vertically	✔	no
Reveal Codes	✔	no
Save workspace	✔	no
Search for any codes	✔	no
Application bar	✔	no
Context-sensitive property bars	42	13
Internet*		
Automatic natural language hyperlinks	✔	no
Corel Barista™ (for Java™ publishing)	✔	no
Java applets	✔	no
Formatting Tools		
QuickFonts™/font preview	✔	no
Spell check drop cap words	✔	no
Guidelines	✔	no
Font preview from drop-down list	✔	no
Styles can include text and graphics	✔	no
User-defined borders and fills	✔	no
Image rotation	✔	no
Parallel columns	✔	no
Captions on any side of image	✔	above and below
Make It Fit™ to expand documents	✔	no
Customizable Make It Fit options across multiple pages	6	none
Undo levels	300	100
Multiple character drop caps	50	1
Tables		
Row and column indicators	✔	no
Automatic data fill (QuickFill™)	✔	no
Format painter tables	✔	no
Automatic calculation	✔	no
Formulas function across tables	✔	no
Number of formulas	98	18
Long Documents		
Create new lists	✔	no
Expand/contract subdocuments individually	✔	no
Predefined document summary fields	51	27
Proofing Tools		
Combined Spell Checker/Thesaurus/Grammar	✔	no
Prompt-As-You-Go	✔	no
Document dictionaries and editable main dictionary	✔	no
Automatic sentence rewrite (PerfectSense™)	✔	no
SGML		
Import/export	✔	no
SGML editing and validation	✔	no
Document creation tools based on DTD	✔	no
Transitioning		
Backward compatibility	✔	no
Convert Corel WordPerfect for DOS macros	✔	no
Use existing Corel WordPerfect for Windows® macros	✔	no
Corel WordPerfect for DOS keyboards	✔	no
Convert Corel WordPerfect 6.x files	✔	import only

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Spreadsheet Features	Corel® Quattro® Pro 8	Microsoft® Excel 97
WYSIWYG editable view	✓	no
Cell reference checking	✓	no
QuickCell™	✓	no
Copy, cut, paste discontinuous ranges	✓	no
QuickCharacter™ insert	✓	no
Consolidation, budget and scenario experts	✓	no
Sort reuse list	✓	no
QuickType™ formulas	✓	no
Edit headers/footers onscreen	✓	no
WordPerfect (including tables) and Quicken Quattro® (WKQ/WQ2)/Quattro Pro Notebooks (WB2, WB3) imports	✓	no
Formula Composer™	✓	function wizard
Fit-As-You-Go™ (no '*****')	✓	limited
Core @functions	504	400

Presentation Features	Corel® Presentations™ 8	Microsoft® PowerPoint® 97
Support for Intel MMX™ technology	✓	no
Publish to Java (Corel Barista)	✓	no
QuickKeys keystroke actions (such as go to another slide, launch an application, play a sound, or even link to a URL)	✓	no
Add multiple slides simultaneously	✓	no
Import outlines into organization charts	✓	no
Customizable Background Gallery	✓	no
Slide navigation tabs	✓	no
Chart styles	✓	no
Range Highlighter used in datasheet	✓	no
Sort pie slices	✓	no
Separate drawing mode	✓	no
QuickWarp objects	✓	no
Blend objects together	✓	no
Place/Resize/Rotate chart	✓	no (must separate into objects)
Gradient fill (text and objects)	✓	objects only
Quick 3D any image	✓	drawing objects only
Slide transitions	120	41
Data chart functions (equations)	16	7

Communication Features	CorelCENTRAL™ 8†	Microsoft® Outlook 97
Create a "Planner" containing a calendar and multiple card files	✓	no
Built-in Mail Filters/Rules	✓	no
Add freeform notes to calendar	✓	no
Easily add custom fields to address book	✓	no
Schedule group events over the Internet	✓	no
Assign To Do items over the Internet	✓	no
Easily follow e-mail threads	✓	no
Compose content-rich HTML messages for assigned To Do items	✓	no
Type personal To Do items directly in list	✓	no
Use the Internet for long distance calls	✓	no
Edit address book entries in view mode	✓	no
Access Internet newsgroups and corporate discussion groups using mailbox interface	✓	no
Conduct and save a "live" chat session	✓	no
Click on hyperlinks to go to linked information	✓	no
Organize cards into groups	✓	no
Participate in collaborative Internet browsing	✓	no
Support for LDAP	✓	no
Surf the Internet using an integrated browser	✓	no
Create simple, flexible card files	✓	no
Link cards to documents or applications	✓	no
Have information "pushed" to you for instant access	✓	no

"WordPerfect . . . offers a wider selection of utilities in the box — and costs $200 less."

PC Computing, July 1997

PC WORLD

OCTOBER

VOLUME 15 ◆ NUMBER 10

COVER STORY

135 THE COMPLETE TROUBLESHOOTING GUIDE

Exorcise demons with this special section on keeping your PC up and running—from secrets for preventing and fixing problems to straight talk on software tech support.

136 HOW TO KEEP YOUR PC TROUBLE-FREE

HOW-TO Hate watching while your PC crashes or spits out error messages? Here are tips to keep disaster away—how to tune up your hard drive, set up PC maintenance, zap bugs, and find the best utilities, books, and online resources. Plus a handy card with your PC tune-up schedule.

138 Hard Disk Housekeeping

140 The Complete PC Toolbox

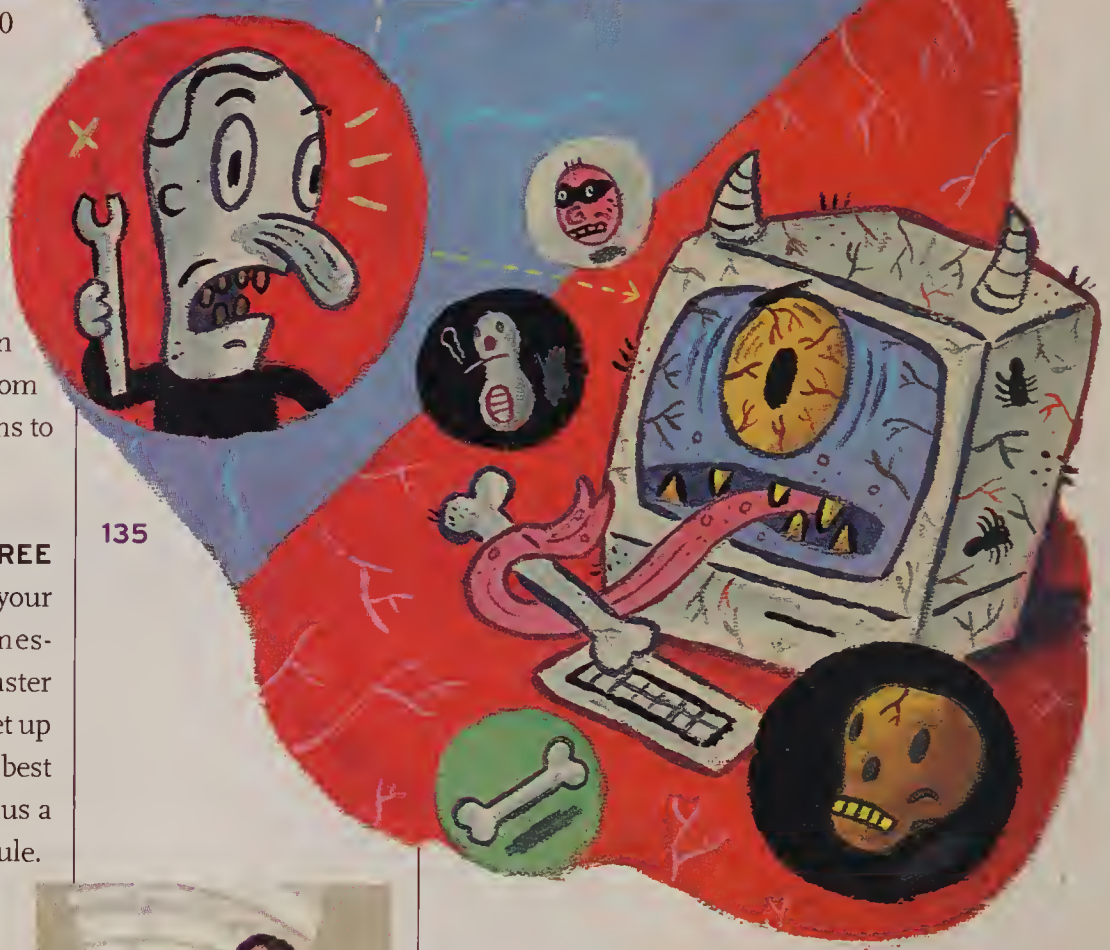
146 Keep Your PC Safe and Secure

151 Your PC Tune-Up Schedule

154 WANT GOOD SOFTWARE SUPPORT? GOOD LUCK...

CONSUMER ISSUES

We've seen it all: voice-mail mazes that put you on hold, ineffective FAQs that don't answer your questions, inexperienced support personnel who know less than you do. We made phone calls, sent e-mail, and culled through Web sites to check out the sorry state of tech support.



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FEATURES

176 EVERYTHING YOU NEED TO RUN YOUR BUSINESS

REVIEW Businesses come in all shapes and sizes, but every one of them must manage time, money, and resources. Our experts pick the best software in five essential categories: accounting, business planning, contact management, project management, and human resources.

203 2D AND 3D GRAPHICS BOARDS: YOU CAN'T ALWAYS GET WHAT YOU WANT

REVIEW Whether it's 2D for focusing on that 50-page report or 3D for handling heavy-duty graphics and games, we found that no single graphics board does it all. Here are the ones that work best, whether you're struggling with mammoth spreadsheets or monster 3D images.

SPECIAL REPORT

THE WEB AND YOU

227 THE WEB AT YOUR SERVICE

Think the Internet is just all marketing hype and self-promotion? We found four amateur Webmasters whose sites disseminate valuable information as a public service—from a cancer resource center for patients and their families to a site for getting the straight scoop from vets about your pets. Plus, tips for creating your own Web site.

Additional material available on PC World Online: www.pcworld.com

COVER *Photograph by Robert Cardin; digital composition by Jeff Berlin*

ICONS: JEFFREY PELO

TOP OF THE NEWS

58 PENTIUM II-300: THE LATEST MAY NOT BE THE GREATEST
They're faster, but are they better buys? PII-300 PCs aren't that much faster than cheaper PII-266s. And the benefits of AGP aren't due till next year.

64 PENTIUM MMX-233 NOTEBOOKS BREAK SPEED RECORDS
Preproduction PMMX-233 notebooks from Gateway, NEC, and Quantex narrow the performance gap with desktops.

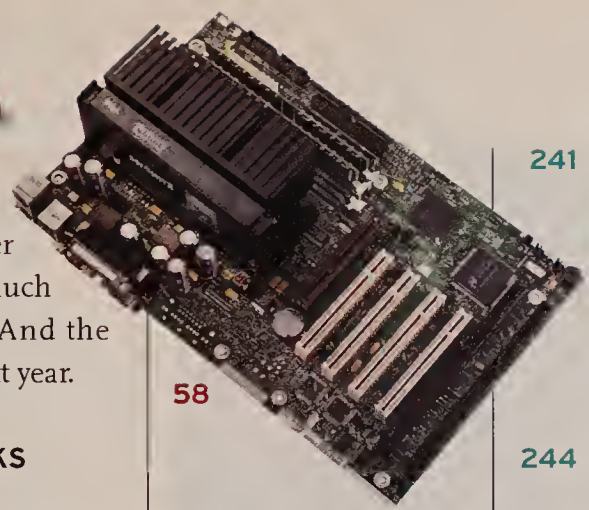
68 SATELLITE, RADIO, SUPER WIRELESS FOR HIGH-SPEED NET ACCESS
Web access options provide high bandwidth, competitive pricing, and fast installation—but they may not be in your neighborhood.

74 COMING PC TECHNOLOGIES: TECHNO-PARADISE OR MERE PUFFERY?
Ports that fix hardware and software conflicts, a true high-performance serial bus, PCs that alert you before problems occur—which technologies will be on your system?

78 INTERNET FILTERS: THE SMUT STOPS HERE. OR DOES IT?
Only two of the top Web filtering programs block sexually explicit material effectively.

NEW PRODUCTS

102 DirectWave MVP V C2-233 Cyrix-based PC
103 Digital HiNote Ultra 2000 notebook
104 Sony VAIO PCG-707C notebook
104 Seanix Baby Grand CS and TCO PCs
108 Alps MD-1000 ink jet printer
108 Diamond GyroMouse
110 AITech PC/TV AirLink
110 Diamond Maximum DVD Kit
114 Sony CPJ-D500 LCD projector
114 Number Nine Revolution 3D graphics card
118 QuarkXPress 4.0
122 Microsoft FrontPage 98
122 Symantec Visual Page
123 Adaptec Easy CD Creator Deluxe
126 Merriam-Webster's Collegiate Dictionary Deluxe
128 Adobe PhotoDeluxe 2.0
128 Corel Paradox 8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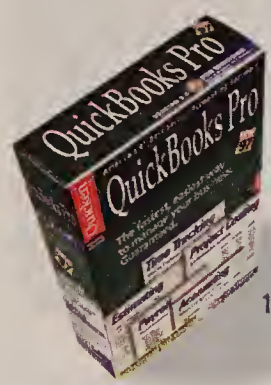

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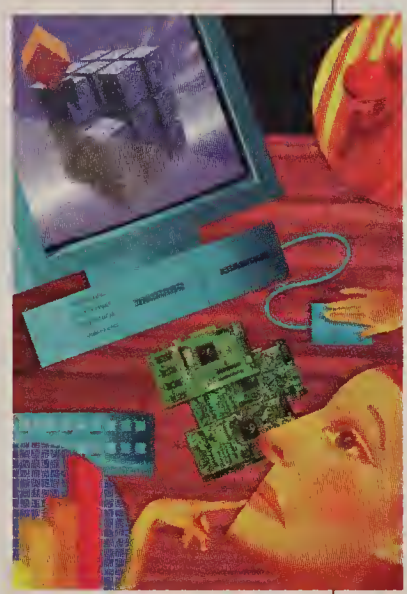
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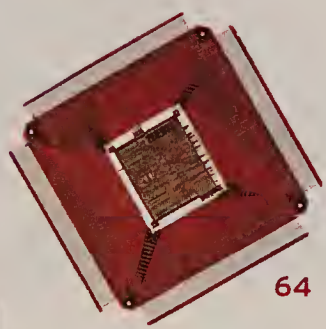
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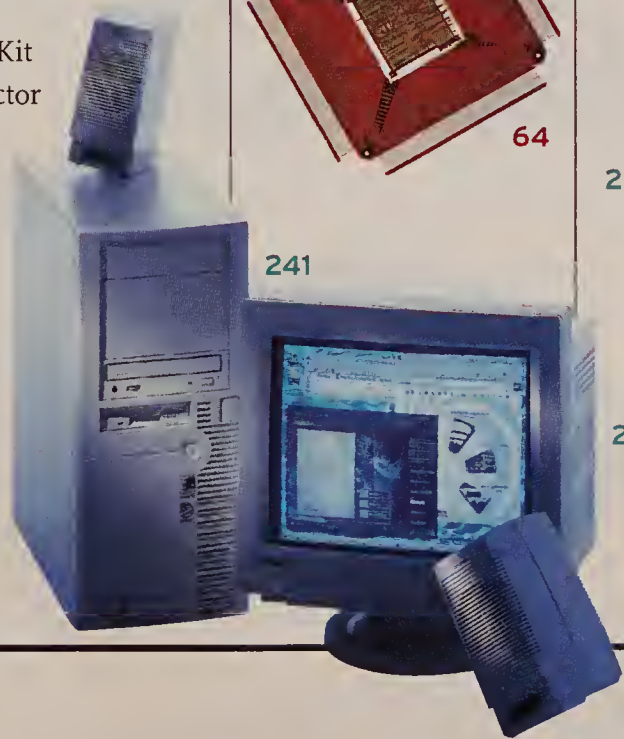
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TOP 100

241 MMX PRICES PLUMMET
online It's like Crazy Eddie is selling PCs. Price cuts on both desktops and notebooks mean sweet deals on MMX systems, including two PCs sporting Cyrix's brand-new 6x86MX Pentium II–class processor.

244 POWER DESKTOPS
TOP 20 Intel-based PCs hang tough on this chart, though the AMD K6–based Nova K6-200TX busts the monopoly with good performance and a $2499 price.

256 BUDGET DESKTOPS
TOP 20 Two Quantex PCs shine: The QP5/200 SM1 MMX wins a Best Buy, while the QP6/266 WS-3x just misses being the first 266-MHz Pentium II on the chart.

268 NOTEBOOKS
TOP 20 As systems like the CTX EzBook climb the chart due to price cuts, others like the $5199 NEC Versa 6200MX make you pay for their power and big screens.

RELIABILITY & SERVICE SURVEY
281 WIN A DELL DIMENSION PC
How satisfied are you with your PC? Fax in this survey for a chance to win a Dell Dimension M200a, a Best Buy PC.

283 PERSONAL PRINTERS
TOP 10 Canon releases a bumper crop of new printers and comes up with a blue-ribbon winner: the $199 BJC-4300 ink jet, our new number one color Best Buy.

287 15-INCH MONITORS
TOP 10 The Panasonic PanaSync Pro P15's clear display makes it our top monitor, and Mitsubishi's Diamond Scan 15VX jumps from number ten to number two.

289 GRAPHICS BOARDS
TOP 10 The best combination of 2D, 3D, and multimedia performance makes Best Buys out of ATI's 3D Pro Turbo PC2TV and Diamond's Stealth 3D 3000.

291 EXTERNAL MODEMS
TOP 10 3Com/U.S. Robotics tops both charts with the Courier V.Everything 33.6 and the Sportster 56K.

HERE'S HOW

330 ANSWER LINE
online Get the right video driver, speed up Windows 95's start-up and shutdown.

334 WINDOWS TIPS
online Find and remove files from unused programs; customize sound, wallpaper, and icons.

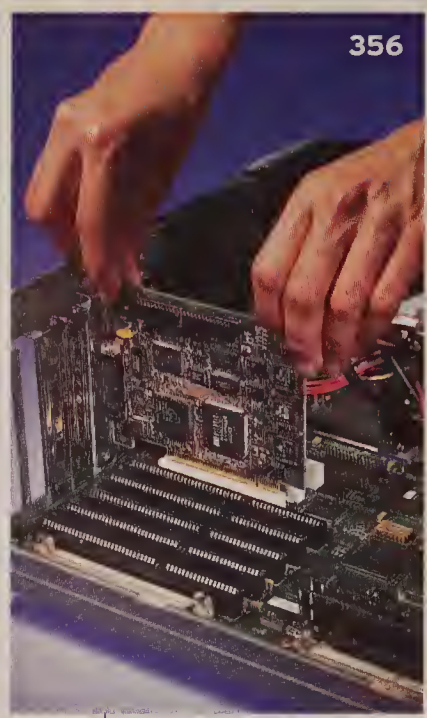
342 SPREADSHEETS
Delete empty Excel rows easily, bypass Lotus 1-2-3's splash screen.

344 WORD PROCESSING
online Clean up e-mail text in Word, split the screen to work on different parts of a document.

348 INTERNET TIPS
online Choose among all of Microsoft's e-mail programs, keep cookies out of your PC.

352 HARDWARE TIPS
Troubleshoot your laser printer, phase out obsolete ISA cards.

356 UPGRADE GUIDE
Install a CD-Recordable drive in your system, step by step.



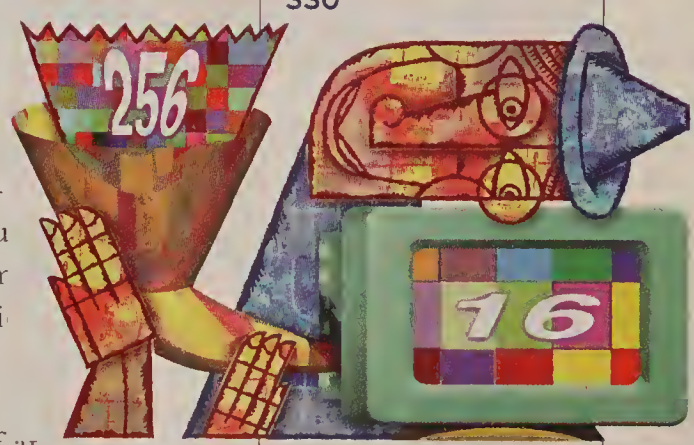
@HOME

313 @HOME PRODUCTS
Easy photo scanning, getting your résumé on the Web, 30 discs of the Complete National Geographic.

314 KEEPING UP
Web sites and services for consumers.

318 TOP 5 HOME PCS
Fast new PCs from Micron and Gateway try bu fail to knock off the num ber one Dell Dimensi XPS M233s.

320 HOME OFFICE
Steve Bass is ticked off at Microsoft.



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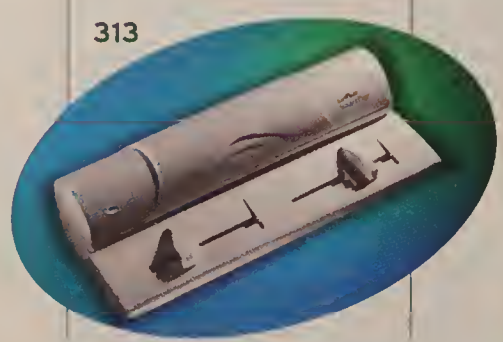

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30 COMING UP

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49 REAL SOLUTIONS A better idea: using a videoconferencing service.

55 BUGS AND FIXES Servicing Office 97, updating SmartSuite 97.

400 FULL DISCLOSURE Manes talks to his PC. Is voice recognition finally here?

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REVIEW Drowning in search sites that give you more than you've asked for? We identify the best search sites for sports, news, travel, and more.
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Where's Help When You Need It?

COMPARED TO TELEPHONES, PCs are still hard to use. That's because telephones perform a single task, while PCs can be programmed to do anything. The more versatile the device, the more elusive the goal of ease of use. The user interface for a jack-of-all-trades like the PC must let programmers adapt the machine to numerous unforeseen and unforeseeable tasks—yet remain understandable to the layperson. Under the circumstances, it's nothing short of miraculous that PCs are far easier to use than alternatives such as terminals. (New products like network computers will be as complex as the number of tasks they're asked to perform—and the difficulty of their user interface will be no different from that of PCs performing comparable tasks.)

The urge to simplify suggests that what the world really needs is a separate device for each task. Of course, each device would cost $200 to $500. And you'd face little problems like arranging your office to accommodate separate machines for word processing, spreadsheets, databases, e-mail, Web browsing, scheduling, business graphics, and so on. To exchange information, the devices would need a network. And since each device would have a different user interface tailored to its own application, you would have to learn many interfaces. No matter how simple the software on each device, you would soon find yourself staying up all night trying to invent something very much like the PC. If you succeeded, you would accumulate wealth beyond your wildest dreams—just like those who played important roles in the early years of the PC industry.

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EVEN THE EXPERIENCED NEED HELP

NOT THAT THE TRIUMPH of a versatile device like the PC reduces the complexity of using it. Regardless of education, IQ, or computing experience, most of us often find ourselves stumped about how to force the PC to do something we need done. For example, I'm convinced that in Freelance Graphics, there must be a better way to manipulate the data behind the charts, but I've never found the solution. For the past week, I've been trying to find the missing color box in Windows Paint. My 3-year-old daughter has somehow caused this essential menu to vanish in such a way that even uninstalling and reinstalling the application won't restore it. (Why was I so foolish as to send an innocent little girl into the jaws of Windows Paint? Because my 6-year-old son was using Orly's Draw-a-Story on another machine.) Were it not for a thousand futile experiments and an accidental right-click, I would never have figured out how to change the color of the ceiling in Broderbund's 3D Home Interiors. My wife says she could have repainted our entire living room in the time it took me to do the ceiling in the simulated version. And while I'm confessing my sins, I might as well admit that several Excel functions know far more about how to manipulate me than I do about how to manipulate them.

TECH SUPPORT TO THE RESCUE?

IN SHORT, IF YOU'RE anything like me, abandon your dream of mastering the PC. Seek help early and often. You'll find it almost everywhere: in help menus, tips articles, how-to columns, tech support CD-ROMs, online forums and newsgroups, vendor voice-mail labyrinths, self-help Web sites, and on and on. More often than not, you'll probably still need to talk to someone on the phone because you'll find no ready answer to the mystery baffling you. To learn the ins and outs of pursuing technical support for your software, read Naomi Wise's "Want Good Tech Support? Good Luck..." Wise reports on how Corel, Intuit, Lotus, Microsoft, Netscape, and Symantec fared at answering *PC World*'s technical questions, how free help compares to what you pay for, and how online help compares to what's available over the phone. You may not be pleased by the facts about technical support today, but you'll be better prepared to get the help you need after reading Wise's article. You'll peek behind the curtains of a major tech support operation, arm yourself with 11 tips for getting better software support, and latch on to a number of other valuable aids.

Through the gloom shines a ray of hope. Most software companies are contracting out their technical support to control costs. This suggests that they attach little importance to supporting the people who buy their complex products. Corel, on the other hand, is seeking a competitive edge by keeping experienced technicians on the job and motivating them to satisfy customers like you. Though Corel's support is by no means perfect, that's worth remembering the next time you buy software.

Phil Lemmons is editorial director of PC World. ■

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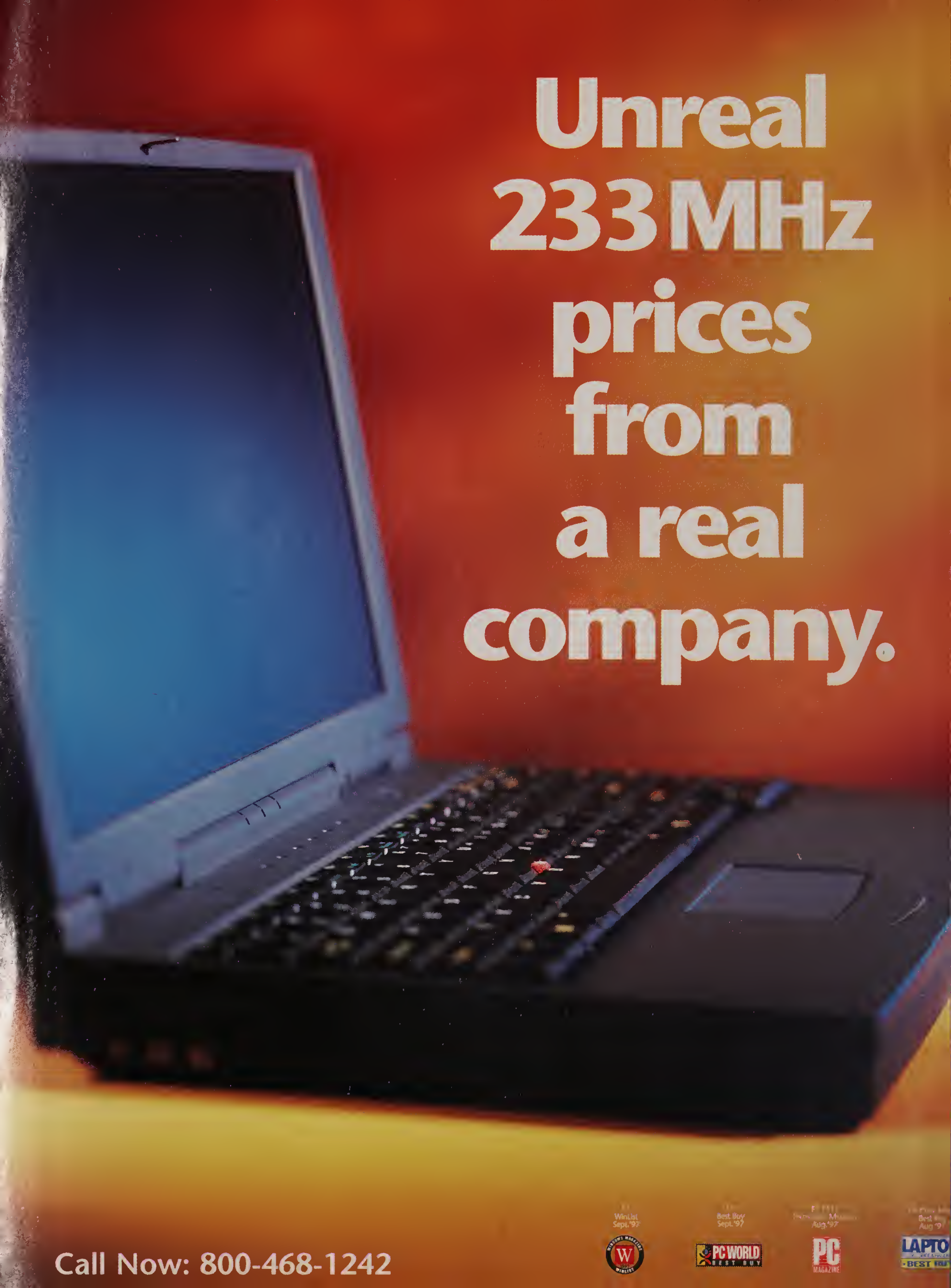
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WE HATE SPAM

YOUR AUGUST *Top of the News* article on the bulk e-mail problem ("Spam Attack: Get Ready for the Bulk E-Mail Deluge") claims that legislating against spam raises "thorny free-speech issues." In fact it does no such thing.

The sending of unsolicited bulk e-mail is wrong because the sender is making unauthorized use of the recipient's hard disk space and Internet resources. It is wrong because, unlike other forms of advertising, it forces the recipient to pay the bulk of the cost for its delivery. It is wrong because it can crowd out legitimate e-mail communication. Finally, it is wrong because it threatens free speech on the Internet by making users unwilling or unable to participate in it.

We don't need an outright ban, only a law saying bulk e-mailers must assume that no one wants their e-mail except those who explicitly say they do.

Far from limiting free speech, the elimination of spam is probably the most important step we can take to protect free speech on the Internet.

Mark Roberts, Rochester, New York

EVERY MONTH I READ countless stories about spam and about the number one producer of this Internet by-product—Cyber Promotions.

I just checked my e-mail and found 50-plus copies of a message from submitking@web3.cybermirror1.com. My first mistake was to reply with "remove" in the subject line. This resulted in my getting *ten* more copies of the message.

I went to the WHOIS database on the InterNIC site, where people can find who owns specific domains on the Net, and looked up the owner of cybermirror1.com. I was not surprised to find the domain registered to Cyber Promotions.

My solution to this pesky problem: to forward each and every piece of spam I receive to domreg@cyberpromotions. I figure as long as I have to deal with the cyber–junk mail, they should, too.

Julie Lemish, Chicago

IN ALL THE TALK about "junk" e-mail, I think that the real issue is not what gets sent to us, but how much work we must do to determine whether we want to read or delete it.

A suggestion I heard recently makes sense: Require all advertising e-mail to show the word "advertisement" in the subject field. This is similar to quality magazines labeling ads that look like articles as advertisements or special advertising supplements.

Masked e-mail sources are simply fraud and should be outlawed. I should be able to identify the source of an item and block any e-mail source I choose. I should be able to remove myself from any list I wish. Anyone who does not comply with such a request is harassing me and should be subject to penalties for doing so.

Unsolicited advertising is one of the prices we pay for living in an open society. However, requiring a little no-cost consideration from the sender can go a long way toward making it less of a burden.

Ed Anderson, Syosset, New York ▶

HOT BUTTON

Sex, Lies, and the World Wide Web

I AM WRITING in response to the inclusion of SmithKline Beecham's Café Herpé site in "Web of Deceit" [August]. I realize the article intended to inform readers that things are not always what they seem on the Web, but I do not believe that "deceit" applies to SKB. This apparently is an informative Web site, and the fact that visitors would be "hard-pressed to find any mention that the site's sponsor manufactures the product it's endorsing" is a positive sign to me. At least SKB is not pushing the product.

As a health-care professional in training, I applaud SKB for recognizing the Internet's value to inform people about their options in obtaining treatment. Multiple ways of obtaining information (especially in the privacy of one's own home) leads to better-informed patients, who can play a more aggressive role in their own health care.

John Hoffman, Savannah

IN FERN CHAPMAN'S article "Web of Deceit," Janice Norton speaks with apparent distaste when she says, "The Web started with defense, math, and science people. And now marketers have taken over."

Well, I'm sorry Janice, but the largest consumer of computer power is business. Is Janice, or anyone else, really so disappointed that private enterprise has a new tool with which to do its job? Is billions of dollars flowing into the economy directly because of the Net a bad thing, to be mourned as these antibusiness folks seem to be doing? Where on earth did this idea come from that commerce is bad? If that's not what these people are trying to say, why is it such a strong undercurrent in their writings?

Eric Florack, Rochester, New York

WITH ALL THE attention your magazine has given to the issue of Web sites' collecting marketing information from visitors without disclosure, I thought I'd share my simple solution to this problem: I lie.

I lie about my age, sex, income, marital status, sexual preference, and any other inane piece of personal information that a site requests. If more users did this, marketers couldn't trust the information they collected, and they might stop asking. So, if you're sick of this practice, fire up your browser and spread as much personal disinformation as you can.

Darren Fuerst, Windsor, Ontario

ILLUSTRATION: JAMES YANG

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i was here

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DUMB DIGERATI

IN THE AUGUST issue, Phil Lemmons [Up Front] asks "How Dumb Are the Digerati?" Well, I guess I am a dumb bozo, since I've no idea what the "digital elite" is. (Is that like people with T3 lines running to their bedrooms?) In any event, I read the proposed American Society of Magazine Editors guidelines (whose eight points seek to keep advertising and editorial in online publications distinct and separate), and think they sound reasonable. It's good to see the ASME making an attempt to police its own. Still, I might suggest adding a ninth item to that list. Ask all "advertorial" sites to include the following HTML code: <P><H1>Yet another<I><B> self-serving opinion. </B></I></H1></P>. You might not need the other eight items then.

Jim Lentz, Internet

SOFTWARE MISDIAGNOSIS

IN YOUR AUGUST *@Home* section, Naomi Wise criticizes Home Medical Advisor and Mosby's Medical Encyclopedia for not giving "in-depth medical advice." I doubt that any medical software could (or should) perform such a task. What company's legal department would allow a product to give specific medical advice? The legal risks would be staggering. The best the user of home medical software can hope for is the kind of information already being provided: factual, not diagnostic. For help with a specific problem, see your physician, not your PC.

William Gembal, Seattle

THEMES HIJACKED

WHOA! I DIDN'T READ "Best Free Stuff Online" [May], but did see July *Letters*, in which A. J. of AJ's Desktop Themes Web site makes it clear he thinks that just because he spends time altering other people's work, *he* should get the credit. As a photographer, I find this pervasive mentality distressing. The fact is, any original work is the sole intellectual property of the creator. A. J. can spend 30 minutes, 30 days, or 30 years "modifying" other people's desktop themes, and they will still belong to those people.

Braden Walters, Regina, Saskatchewan

DELUGE OF DELL

IN THE AUGUST issue, I noticed an overwhelming amount of Dell advertising. I counted five full two-page and two one-page Dell ads. That is 12 pages of Dell advertisements, not including the back cover foldout. I then read over your Top 20 listings. The first three computers on the Top 20 Power Desktops chart are Dells. The top two computers on the Top 20 Budget Desktops are Dells. You also rated the Dell Latitude number one on your Top 20 Notebook PCs! What the heck is going on here? I understand that you need computer manufacturers to advertise in your magazine, but this seems excessive.

Ryan Jones, Reno, Nevada

Editor's response: Your question is understandable, but we can tell you there is absolutely no connection between ad sales and editorial. In fact, *PC World* sales reps are enjoined from talking to editors about anything editorial. We take the separation of "church and state" very seriously here.

As for Dell's grip on the top of the charts, that is in large part a result of readers' satisfaction with Dell. We do many reader surveys, and they've said clearly that a PC's reliability and a vendor's service and support are very important. So we weight those factors heavily in our Top 100 calculations. Dell, it turns out, is one of the few companies that consistently scores Best in our fax-back Reliability and Service survey results (the form appears in every issue).

For more information on how the Top 20 works, read "Your Guide to the Top 100," which appears every month in the Top 100 introduction. If you have suggestions on how to make the Top 100 more useful, please send them to us. –Tracey Capen

CORRECTIONS AND CLARIFICATIONS

IN "THE BEST PRODUCTS OF 1997" (July), a World Class runner-up award for Best Application Environment went to Microsoft Exchange Server 4.1 for NT. The version number should have been 5.0.

In *New Products* (September), the URL for PC-cillin HouseCall should have been listed as housecall.antivirus.com.

PC World regrets the errors.

When the end comes, send your toner cartridge to a better place.

It lived a long healthy life. It worked hard for you. Now's your chance to bid it a proper farewell. Introducing HP's Planet Partners—an easy, free recycling solution. Returned HP cartridges are converted into raw materials to be used in the manufacturing of everyday products. Packages and postage are provided for any quantity. Call 1-800-340-2445 for details. After all, why trash your old toner cartridges when you can give them eternal life?

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Why NEC NOW?

- The security of partnering with a company known for its technological innovations.
- The flexibility of ordering direct or through a reseller.
- The expertise of System Consultants.
- The immediate availability of competitively priced products.
- The resources of one of the world's largest computer companies.

NEC NOW

MMX™ intel inside pentium® PROCESSOR

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- 7.0GB Ultra DMA Hard Drive/32MB SDRAM
- Number Nine PCI Revolution 3D, 4MB WRAM
- Altec® ACS-45 Speakers/AWE32 Wavetable Audio
- Iomega® Zip Drive
- U.S. Robotics® 56Kbps* Data/Fax/Voice Modem
- NEC C700™ 17" Monitor (16" v.i.s.)

* Upgrade to NEC MultiSync® A700™ 17" Monitor (15.6" v.i.s.), add $229
* Upgrade to 64MB SDRAM, add $199

$2649
Business Lease: $95/mo.

Direction SPT233

- 233MHz Pentium processor with MMX technology/512KB L2 Pipeline Burst Cache
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- Number Nine PCI Revolution 3D, 4MB WRAM
- Altec ACS-45 Speakers/AWE32 Wavetable Audio
- NEC C700 17" Monitor (16" v.i.s.)

* Upgrade to Altec ACS-410 Speakers with ACS-251 Subwoofer, add $69
* Optional U.S. Robotics 56Kbps* Data/Fax/Voice Modem, add $119

$2379
Business Lease: $86/mo.

Direction SPT233

- 233MHz Pentium processor with MMX technology/512KB L2 Pipeline Burst Cache
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM PCI Graphics Card
- Altec ACS-45 Speakers/Integrated Yamaha Sound
- NEC C550 15" Monitor (14" v.i.s.)

* Upgrade to NEC C700 17" Monitor (16" v.i.s.), add $199
* Upgrade to AWE32 Wavetable Audio, add $49

$1949
Business Lease: $70/mo.

Direction SPT200

- 200MHz Pentium processor with MMX technology/512KB L2 Pipeline Burst Cache
- 3.2GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM PCI Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- NEC C550 15" Monitor (14" v.i.s.)

* Upgrade to NEC C700 17" Monitor (16" v.i.s.), add $199
* Upgrade to Iomega Zip Drive, add $99

$1789
Business Lease: $64/mo.

Direction SPL300

- 300MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 9.0GB SCSI Hard Drive/64MB SDRAM
- Number Nine AGP Revolution 3D, 4MB WRAM
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- Adaptec 2040UW SCSI Controller
- Iomega Zip Drive
- NEC C700 17" Monitor (16" v.i.s.)
- MS Windows NT® 4.0

* Upgrade to 128MB SDRAM, add $379
* Upgrade Video Memory to 8MB WRAM, add $119

$4229
Business Lease: $148/mo.

Direction SPL300

- 300MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 6.4GB Ultra DMA Hard Drive, 9.5ms/64MB SDRAM
- Number Nine AGP Revolution 3D, 8MB WRAM
- Altec ACS-45 Speakers/Wavetable Audio
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- Iomega Zip Drive
- NEC C700 17" Monitor (16" v.i.s.)

* Upgrade to Altec ACS-410 Speakers with ACS-251 Subwoofer, add $69
* Upgrade to NEC MultiSync A700 17" Monitor (15.6" v.i.s.), add $229

$3499
Business Lease: $126/mo.

Direction SPL300

- 300MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 7.0GB Ultra DMA Hard Drive/64MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Wavetable Audio
- NEC C700 17" Monitor (16" v.i.s.)

* Upgrade to Number Nine AGP Revolution 3D, 4MB WRAM, add $219
* Upgrade to Iomega Zip Drive, add $99

$2949
Business Lease: $106/mo.

Direction SPL266

- 266MHz Pentium II processor with MMX technology/512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- NEC C550 15" Monitor (14" v.i.s.)

* Upgrade to Wavetable Audio, add $49
* Upgrade to NEC C700 17" Monitor (16" v.i.s.), add $199

$2329
Business Lease: $84/mo.

To order, get a free catalog or find your nearest reseller call: Mon-Fri 8am-8pm EST

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Circle 180 on reader service card

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1996 Government Computer News Best New Product Award at FOSE Finalist
1995 Computer Currents Readers Choice Award
1993 Shareware Industry Award
1992 Premiere Computing Magazine Award
1992 Dvorak/Zoom Award

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Circle 212 on reader service card.

JUST IN TIME

I'M A TECHNICAL SUPPORT guy for an Internet service provider and want to say thanks. I just received the *PC World* August issue today and had a customer who needed help with Internet Explorer and clearing the cache. If I had not seen your article ["Browser Secrets"], I would have had to turn this customer away. Keep up the good work.

Steven Lassiter, Los Angeles

EVEN OUR READERS HELP

I JUST READ Peter Davies' comments on serial port speeds in August *Letters*. Since my recently purchased 3Com/U.S. Robotics Sportster 33.6-kilobits-per-second modem seemed to be performing no better than my old 14.4-kbps one, I decided to check the serial port speed in Windows 95. Sure enough, the port speed was listed as 19200. I changed it to 57600, went back online, and am now enjoying the speed I paid for. Another reason I'm renewing my subscription—even my fellow readers help me out.

Jeff Wright, Internet

DON'T PUSH

AS A COMPUTER USER I do not want "push" technology. Advertising companies want it so they can get more "hits" on users, but users do not switch on their computers in order to get hit. Push should die even before it is born, because the dollar-driven clods who think this is a good idea are thinking only of themselves.

Lyndon S. Cox, Internet

PC World *welcomes your responses, ideas, and other letters to the editor.* *See page 14 for contact information.* ■

AND THE WINNERS ARE...

THE FOLLOWING READERS WON prize systems when their returned Reliability and Service surveys were selected at random:

March: William H. Winters, Seymour, Indiana
April: Barry Palmer, Sterling, Massachusetts
May: Suzanne Barnhill, Fairhope, Alabama

COMING UP IN NOVEMBER

REAL, CAN'T-MISS UPGRADES

Could it be? Cheap RAM, cool new 3D boards, and $300 OverDrive chips that make your Pentium-100 run like a Pentium MMX-166? We've got the latest on upgrades that look promising for that creaky old P-75 or P-100.

56 KBPS—HERE AT LAST

Finally, modems that promise Web access without long waits...but will your ISP work with them? We look at the new wave of 56-kbps modems and sort out the best buys likely to give you the least hassle.

PC/TV: COMING SOON?

Are your PC and TV turning into one Web-surfing, all-apps-in-one entertainment center? Here's our take on real products you can buy now and what to expect in the future.

WEB BROTHER IS WATCHING

More businesses are disciplining employees for everything from accessing adult Web sites to chatting online. Here's what you should know about surfing the Internet on company time.

ALSO NEXT MONTH

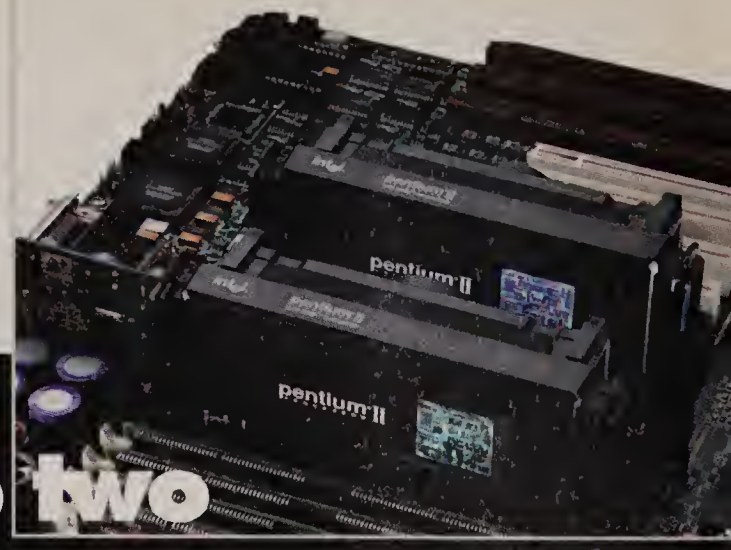
▶**The PC World Top 100:** The Top 20 power desktops, budget desktops, and notebooks, and Top 10 printers, monitors, graphics boards, and modems.

▶**Training to Better Use Your Software:** We rate a slew of training products—books, videotapes, and CD-ROMs—and found real productivity boosters.

▶**Here's How:** *Upgrade Guide* on installing a new CPU, *Windows Tips* on the best tricks for using WinZip, *Hardware Tips* on the best hardware and software reference books.

PC WORLD

It's a mini-tower, it's a rack drawer, it's...



..The ALR Revolution 2X

Up to two Pentium Pro or Pentium II Processors

The Revolution 2X's convertible chassis makes migrating to future rack-mount configurations easy and affordable.

It's said that flexibility is the key to success in today's corporate world. By that criteria, the Revolution 2X is definitely the system of choice for success-minded businesses. With this one computer you can choose between Pentium® Pro or Pentium® II processor technology, single or dual processing, workstation or server configurations, and mini tower or rack-mount form factors. Mix and match those features you need without having to pay extra.

And this flexibility lasts for years. You can start with a single Pentium Pro processor-based mini-tower, upgrade to dual processing then upgrade to single or dual Pentium II processor technology after that. And when your business develops a centralized enterprise network, the Revolution 2X can evolve into an easy-access rack-mountable system.

To learn more about the remarkable Revolution 2X please call ALRs toll-free number today.

Twice the Memory
With room for 512-MB of RAM, the Revolution 2X offers twice the memory capacity of competitive Pentium II chip-based systems

More Expandable
4 available PCI expansion slots, three EISA slots (one position is shared), a built-in 2-MB video subsystem saves expansion slots, configuration time, and money. A cost-effective option includes integrated Fast/Wide ultra SCSI.

RAID Reliability
Hot-pluggable drive bays and array subsystems are available for network applications requiring on-line drive replacement.

InforManager with ActiveCPR

Because down-time is just not an option
Server models include ALR InforManager, an advanced hardware management subsystem that helps users head off potential problems before they lead to costly downtime. These models also include ALR ActiveCPR processor fail-over/protection and ALR Server Watchdog server auto-recovery. These technologies make the Revolution 2X ideal for unattended web-server applications and other environments requiring 24-hour access with limited maintenance.

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5 YEAR 36 MONTH warranty

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Circle 9 on reader service card

Tell your CEO PCs with the

AMD-K6™ MMX™ Enhanced Processor give you

the power to beat the competition.

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Performance enthusiasts and cost controllers, rejoice. No matter how much or how little you want to spend on a Microsoft Windows® compatible PC, you'll get higher performance from a system based on the AMD-K6™ MMX™ Enhanced Processor. Check out the stats: blazing 233 MHz clock speed. Eye popping multimedia capability. And sound quality even an audiophile will love. An AMD-K6 based system is more than an alternative to a Pentium® II based PC. It's the one that gives you more alternatives. Because with the money you save, you can get twice as much memory. A better video card. Better audio. And a faster modem. In short, AMD-K6 based systems give you more performance (CEO will approve) for the same money (CFO will approve). To get the rest of the story, hit our web site (you will approve).

AMD

www.amd.com

Tell your CFO it's a responsible fiscal decision.

Circle 16 on reader service card

We just made your choice a little easier...

The CyberMax A53 powered past the competition and impressed the editors at *PC Computing* so much that they honored us with their **5 Star Award.** This award exemplifies a "market leader that offers exceptional performance".

June 1997

In this year's June 24th issue, *PC Magazine* awarded **CyberMax** their prestigious Editors' Choice Award

JUNE 1997

Impressive. For the second time, in four short months, CyberMax received the prestigious *PC Computing* **5 Star Award.** This time around, it was for one of our **Cyrix™ 6x86MX**'s which, along with the AMD-K6, offer exceptional value and performance when compared to the Pentium® II's.

September 1997

The September issue of *Window Sources* awarded **CyberMax** their **Stellar Award** because "the Winstone® 97 score of 50.2 stacks up well against those of the more expensive Pentium II 266-MHz systems from Gateway and Quantex we reviewed this month."

September 1997

On ten occasions over the last six months, **CyberMax** was in the *PC World's* **Top-20 Budget Desktop** list.

April - September 1997

"An impressive balance of features, performance and price makes the CyberMax PowerMax A62 233MMX one of the best values among this group of K6-based systems."

September 1997

DO1006 **$1999**

Business Lease.... $70

Our System of the Month

- AMD-K6™ 233MHz Processor w/ MMX™ Technology
- 64MB EDO Memory
- STB Velocity 3D Video Card w/ 4MB VRAM
- 5.1GB Hard Drive
- 24x Max CD-ROM, Ensoniq AudioPCI™ 32-bit Sound
- K56flex™ Protocol Fax/Mdm w/Voicemail & Speakerphone
- 17" (15.8"VA) 1280x1024 Color Monitor
- Altec Lansing ACS45 Powercube Speakers & Subwoofer
- Corel WordPerfect Suite 8 & Max's Business Pack

K6-200.....$1899
Pentium® II-266.....$2399
Add Iomega Zip 100MB IDE Drive.....$99

"For a below average price, the CyberMax PowerMax A62 233MMX delivers an outstanding package of components and software, as well as a superlative performance punch."

September 1997

CyberMax joins the elite group of Dell, Gateway, Hewlett-Packard & Micron who have won the **1997 *PC Magazine* Editors' Choice Award.**

CyberMax accepts Visa, MasterCard, Discover, American Express, prepaid checks and electronic wire transfers. Purchase orders from government agencies, universities, and Fortune 500 companies can also be accepted. All returned items must have an RMA number and must be in original packaging. The cost of returned freight is not included with any money back guarantee; shipping charges are not refundable. Prices and product descriptions are subject to change without notice. Microsoft, and Windows 95 are registered trademarks of Microsoft Corporation. Pentium, MMX and the Intel Inside Logo are registered trademarks of Intel corporation. AMD and Am5x86 are registered trademarks of Advanced Micro devices, Inc. Dell, Gateway, Hewlett-Packard and Micron are registered trademarks of their respective companies. *On-site service may not be available in certain remote areas, and is available only if determined to be necessary by our technicians; GE 4 year warranty is optional. Products may differ from image shown.Leasing terms:36 month/10% FMV option, taxes and shipping additional.

AMD K6 MMX™ ENHANCED PROCESSOR

PII Class - Small Office/Home Office

Technology today empowers us to work for ourselves and on our own terms. More than ever before, entrepreneurs and parents are beginning to bring the office home. *Soho (small office/home office)* captures the essence of what makes America great, the freedom to make our dreams come true. If you ever wanted to start your own small business or work at home, CyberMax can cover all of your computing needs. We feature systems powered by the AMD-K6™ with MMX™ technology, which runs both Windows® 95 and NT™ at top speed and delivers industry-leading performance on both 16 and 32-bit code. At CyberMax, we understand your needs and offer sensible solutions— and that's taking care of business.

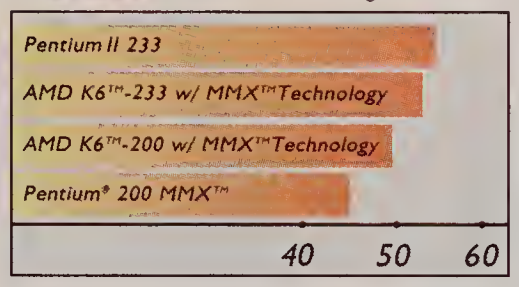
The PowerMax P1

DO1001 **$2749** Business Lease.... $91

- Intel 266MHz Pentium® II Processor w/MMX™ Technology
- 64MB EDO Memory
- Matrox MGA Millennium II Video Card w/ 4MB WRAM
- 6.4GB Hard Drive
- 24x Max CD-ROM, Ensoniq AudioPCI™ 32-bit Sound
- Iomega Zip 100MB IDE Internal Drive w/cartridge
- K56flex™ Protocol Fax/Mdm w/Voicemail & Speakerphone
- 17" (15.8"VA) 1280x1024 Color Monitor
- Altec Lansing ACS45 Powercube Speakers & Subwoofer
- MS Office 97 Small Business Edition & Business Pack

PII-233.....$2649
19" Monitor.....$249

Ziff Davis Winstone® 97
running Windows® 95



Choose the superior solution— the AMD-K6™ with MMX™ technology is the superior engine for Windows® computing. The AMD-K6 rivals the performance scores of the Pentium II processor.

The PowerMax A2

DO1002 **$2249** Business Lease.... $78

- AMD-K6™ 233MHz Processor w/ MMX™ Technology
- 64MB EDO Memory
- Matrox Millennium II Video Card w/ 4MB WRAM
- 6.4GB Hard Drive
- 24x Max CD-ROM, Ensoniq AudioPCI™ 32-bit Sound
- K56flex™ Protocol Fax/Mdm w/Voicemail & Speakerphone
- 17" (15.8"VA) 1280x1024 Color Monitor
- Altec Lansing ACS45 Powercube Speakers & Subwoofer
- MS Office 97 Small Business Edition & Max's Business Pack

K6-200.....$2149
Pentium® II-266.....$2649
Upgrade to 8.0GB HDD.....$149

COMPUTER SHOPPER

"The K6 performed almost identically to the Pentium® II system on the mainstream business applications in Winstone 97 (under Windows 95)"
September 1997 - **K6 Contenders** (p. 180)

The PowerMax A3

DO1003 **$1799** Business Lease.... $63

- AMD-K6™ 233MHz Processor w/ MMX™ Technology
- 32MB EDO Memory
- STB Velocity 3D Video Card w/ 4MB VRAM
- 4.3GB Hard Drive
- 24x Max CD-ROM, Ensoniq AudioPCI™ 32-bit Sound
- K56flex™ Protocol Fax/Mdm w/Voicemail & Speakerphone
- 17" (15.8"VA) 1280x1024 Color Monitor
- Altec Lansing ACS90 Speakers
- Corel WordPerfect Suite 8 & Max's Business Pack

K6-200.....$1699
Pentium® II-266.....$2099
Add Iomega Zip 100MB IDE Drive.....$99

The PowerMax A4

DO1004 **$1499** Business Lease.... $52

- AMD-K6™ 200MHz Processor w/ MMX™ Technology
- 32MB EDO Memory
- STB Nitro 3D Video Card w/ 4MB EDO DRAM
- 4.3GB Hard Drive
- 16x Max CD-ROM, Ensoniq AudioPCI™ 32-bit Sound
- K56flex™ Protocol Fax/Mdm w/Voicemail & Speakerphone
- 15" (13.8"VA) 1280x1024 Color Monitor
- Altec Lansing ACS90 Speakers
- Corel WordPerfect Suite 8 & Max's Business Pack

K6-233.....$1599
Upgrade to 6.4GB HDD.....$149
Add the MS Natural Keyboard.....$49

The PowerMax A5

DO1005 **$1299** Business Lease.... $45

- AMD-K6™ 166MHz Processor w/ MMX™ Technology
- 16MB EDO Memory
- STB Nitro 3D Video Card w/ 2MB EDO DRAM
- 3.2GB Hard Drive
- 16x Max CD-ROM, Ensoniq AudioPCI™ 32-bit Sound
- K56flex™ Protocol Fax/Mdm w/Voicemail & Speakerphone
- 15" (13.8"VA) 1280x1024 Color Monitor
- Altec Lansing ACS90 Speakers
- Corel WordPerfect Suite 8 & Max's Business Pack

K6-200.....$1399
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Don't Get Mad, Get Online

Consumers' ability to air grievances on the Net has forced companies to respond to client complaints.

JEREMY COOPERSTOCK DIDN'T expect much when he wrote a letter to United Airlines last spring about a problem-ridden intercontinental flight. All he wanted was a formal response to the litany of problems he encountered on a flight from Toronto to Tokyo .

But after two months (and a follow-up letter), the only reply Cooperstock had received was a form-letter apology, along with two $100 vouchers toward a future United flight. Although the coupons would come in handy later, what he really wanted was an explanation for the troubles he'd detailed in his two-page missive, including, missed connections due to flight delays (announced, oddly enough, only in Chinese); bungled seat assignments, despite having made reservations months in advance; and a wool suit that was ruined when a flight attendant placed a stroller on top of a garment bag in the cabin storage area. Frustrated by United's lack of concern, Cooperstock did what any computer-savvy consumer activist would do: He created a Web page and shared his gripes with the world.

Cooperstock's first "anti-United" site went live in August of 1996. He dubbed it "Poor Show," and promptly informed United of its existence because he wanted the airline to know the consequences of poor customer service. "It wasn't the poor treatment we received from United, but rather the subsequent disregard for a serious, polite complaint that led to the creation of the Web pages," explains Cooperstock.

In one three-month period, the site has had 1500 hits, mostly from other United customers. It's also attracted the attention of United employees. According to access logs, says Cooperstock, 227 of those 1500 hits to the site were from the United URL. He adds that he has exchanged e-mail with several United employees about issues raised on his site.

A UNITED FRONT

THOUGH IT'S TOUGH to estimate the site's real effect, United has since begun a new ad campaign emphasizing the airline's efforts to better its customer service. "One thing is for certain," says Cooperstock, "letters that were once ignored by United's customer relations officials are read more carefully after they are posted to my site." Some are even acted on by industrious employees: In one case, a United customer service representative happened to read about a customer's problems on Cooperstock's pages and helped to resolve them.

As for the corporate muckety-mucks, executives at United's headquarters also acknowledged the site's existence after a few months: They threatened to sue for trademark infringement. While the name "Poor Show" could have referred to any company, Cooperstock's use of United's "Friendly Skies" banner with a big red X spray-painted through it and the words "Yeah, right!" below it made him vulnerable to legal action. He's since changed the name of the site to Untied Airlines (www.untied.com) and eliminated all the United logos and slogans. The opening screen now sports an airplane bear- ▶

ILLUSTRATION: DAVID PLUNKERT

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ing the name, "Untied Airlines," and a new slogan: "The most Unfriendly Skies."

Is Untied Airlines a fluke? I don't think so. Like Cooperstock, Josh Brannon got revenge with his own Web page, called "Infiniti Hell" (websource1.com/infin/), after he was unable to get satisfaction from his local car dealer or from the corporate offices of the luxury automobile manufacturer. And people boycotting all kinds of companies from Nike to Mitsubishi are expounding their causes on custom-designed Web pages. The targeted companies and the nature of the grievances vary, but in every case the message to corporate America comes through loud and clear: Beware the Web-empowered consumer.

> The nature of the grievances vary, but the message to corporate America is the same: Beware the Web-empowered consumer.

Personalized gripe sites aren't the only way consumers are being heard. Hundreds—perhaps thousands—of individuals are posting messages on Usenet newsgroups, sharing their thoughts on everything from poorly made products to questionable customer service practices.

NOW HEAR THIS!

ALTHOUGH A HANDFUL of newsgroups air complaints and compliments of all types, most people post messages about their experiences on subject-specific newsgroups (such as alt.sys.pc-clone *.companyname* for PC companies or alt .autos.*companyname* for cars).

Gary Cohen understands the power of newsgroups. He broadcast his concerns about Zero Plus Dialing on the misc .consumers site after he was charged $40 for two brief calls made using a calling card from a pay phone. Among the responses Cohen received was an e-mail from a woman whose college-student son had paid close to $600 in overcharges.

Online activism works both ways, says Cohen, noting that he now checks newsgroups for positive and negative comments about a company that he's considering doing business with. On a recent trip to Florida, for example, he wanted to get information about a local scuba diving outfit, so he searched rec.scuba for any reports of problems with the company. Since there were only positive comments, he went ahead and used its services.

Even if you're not ready to share your opinions with the world, it's never been easier to share your thoughts and concerns with the companies with which you do business. Just about every national company is now online, taking advantage of the popularity of the Web to market its goods and services. But did you also realize that those same sites you use to locate a dealer or research products also provide an excellent way to tell companies what you think about their products and services?

A few weeks ago, for example, a bottle of freshly squeezed Odwalla juice that I'd purchased at my local store exploded in my refrigerator, leaving a sticky orange goo all over. Since the juice was still within its "freshness date," I decided to contact the company about what happened. I received a personalized response within 24 hours of sending my e-mail, complete with the sender's direct toll-free phone number and an offer to send me a check for the cost of the juice.

Without the Web, I probably wouldn't have taken the time to send a letter—I would have just grumbled to friends about the mess. Now I get to air my complaint, Odwalla can see if there's a problem with the cooler at the local store, and I get my $5 back for the juice. Sounds to me like everyone wins.

Of course, not every company is so Web accessible. I recently logged on to Alaska Airlines' site to send a note about some late-arriving luggage, but there was no way to reach the customer service department online. The best I could do was send e-mail to the Webmaster asking that my letter be forwarded to the appropriate person. I never heard back.

There's no question the Web is changing the face of customer service. Not only is it easier for consumers to contact companies, but the power to broadcast ▶

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WHERE TO START

IF YOU'RE MAD, but not mad enough to build your own Web site, here's what you can do to voice your concerns about a company's products or services.

- **Check the company's Web site.** If there's a customer service section, post your message there. If not, try e-mailing the Webmaster, requesting it be forwarded to the appropriate person.
- **Post a message on an Internet newsgroup.** Misc.consumer includes queries and complaints on a wide range of topics. Also check newsgroups that focus on specific subjects, such as PCs or cars.
- **Exploit existing Web-based resources.** Consumer World (www.consumerworld.org) has links to dozens of customer service sites for major companies. For links to many complaint sites set up by disgruntled customers, check Yahoo's list at www.yahoo.com/Business_and_Economy/Consumer_Economy/Consumer_Opinion/. The Better Business Bureau now accepts complaints online at its site (www.bbb.org/complaints/consumerform.html).

those concerns to the world adds a whole new dimension to consumer activism—and company awareness of it.

But with this newfound power comes the responsibility to make sure that comments are fair and the concerns valid. Legal experts say you should choose your words carefully and refrain from mentioning specific employees in postings.

It also pays to use discretion when evaluating information posted about a company. Don't base your opinion on a single angry or highly critical letter. Instead, look for a pattern of comments that indicate a company's willingness—or unwillingness—to serve its customers.

The bottom line: It's never been easier to be an informed, proactive consumer. So what are you waiting for? Speak up.

Got a gripe to air? Send e-mail about it or any consumer issue to consumerwatch@pcworld.com. Roberta Furger is a PC World *contributing editor. Her first book,* Does Jane Compute? *will be published by Warner Books in February 1998.* ■

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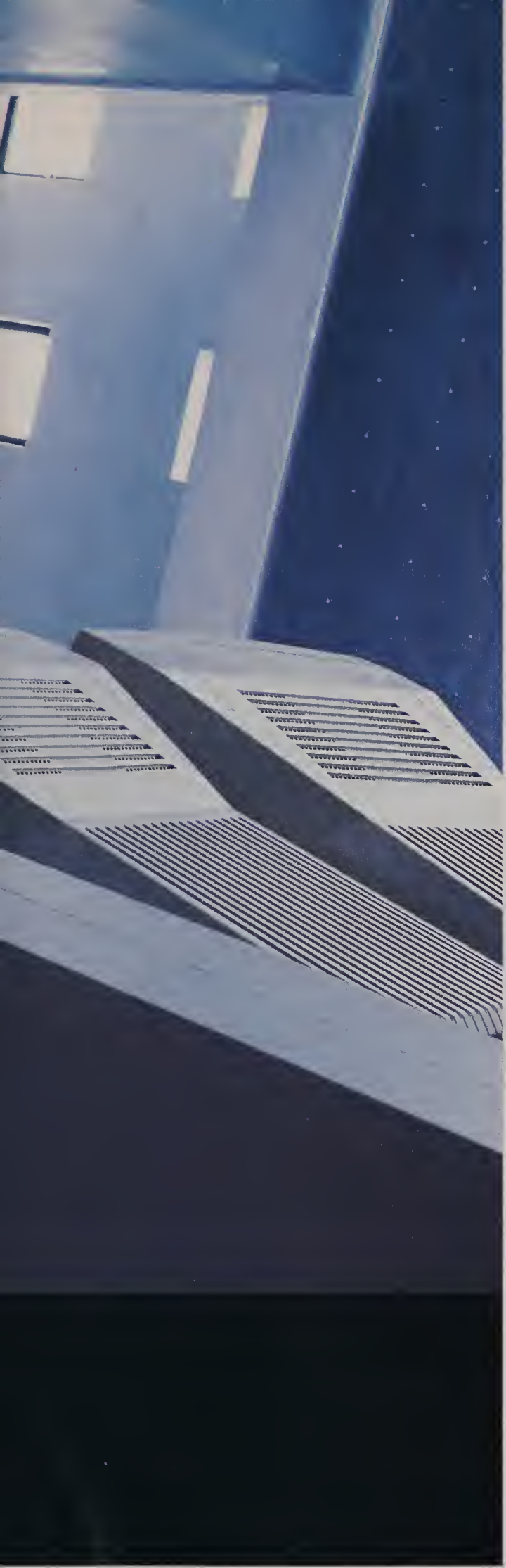
HOW POWERFUL IS THE NEW DELL WORKSTATION?

Mini-tower chassis anticipated to ship 9/97 (although customers can order now). ★ Prices and specifications valid in the U.S. only and subject to change without notice. †For a complete copy of our limited warranties, please write Dell USA L.P., One Dell Way, Round Rock, TX 78682. Attn: Warranties. Δ On-site service provided by third-party providers and may not be available in certain remote areas. 3Com and EtherLink are registered trademarks of 3Com Corporation. ΩCopyright 1997, Standard Performance Evaluation Corporation. Information value correct as of print date. Intel, the Intel Inside logo and Pentium are registered trademarks of Intel Corporation. Windows and Windows NT are registered trademarks of Microsoft Corp. ©1997 Dell Computer Corp. All rights reserved.



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IBM®	IntelliStation M Pro Model 26U INGR w/Intense 3D Pro 1000	$220
SGI	O2 R5000/180MHz SCO2	$533
Sun Ultra	Ultra 1 Creator3D Model 170E w/Creator3D	$446
Digital	Personal Workstation 266i w/AccelGraphics AccelPro 2500TX	$624
SGI	Octane 1x175MHz R10000 SI w/Tram	$922

‡Price per composite score. Lower number indicates greater price value. For more in-depth information, refer to www.specbench.org/gpc/opc/opc.cdrs.summary html.

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Where's my company? ◆ The PC that bounced ◆ Low expectations, high praise

When Your PC Company Goes AWOL

WE'VE RECEIVED A number of pleas from lost Austin Computer owners—Scott Deeck of Jacksonville, Florida, among them. "They're not answering the phone," Deeck laments. "Who do I call for help?"

At press time there was no good answer. Austin Computer Systems of Austin, Texas, went out of business last May and left no trail for customers to follow. Austin's old phone numbers offer only a perpetual busy signal.

Austin's Web site (www.goaustin.com) is still up and running, but it's like a ghost ship, floating untended in cyberspace. It does provide details about an authorized service center (Austin OEM Services, 512/835-0883).

Unfortunately, when you buy a product that requires long-term support, you're stuck if the company goes under. Buying a well-known brand is safer—but more expensive. If you find yourself the owner of an orphaned product, try asking for help on the Net. Check out SupportHelp.com (www.supporthelp.com) or TuneUp.com (www.tuneup.com). Also check newsgroups, like comp.sys.ibm.pc.hardware and alt.comp.hardware.pc-homebuilt. But if something is broken, you'll probably have to pay a local shop to get it fixed.

DEPARTMENT OF STRANGE ADVICE

A READER FROM Boerne, Texas (who asked not to be named), wrote with a fascinating tale of strange tech support advice and a computer case that was impossible to open. He wanted to install a different CD-ROM drive in his Dell Dimension but couldn't open the case. "I called Dell tech support, and the technician suggested I bounce the computer delicately on a carpeted floor," he remembers. Dell refused to send on-site service. Our hapless upgrader called in a beefy wrestler friend for help. The case yielded; the CD-ROM drive got installed.

We asked Dell why on-site service could not help bounce the computer. A spokesperson told us that on-site service is strictly for replacement of parts, not for troubleshooting. However, if our reader had continued to ask for help, "we would have taken a closer look," the spokesperson added.

SURPRISE! WE CAN HELP

DAVE BROWN OF Dunnellon, Florida, read the complaints about Iomega in February's *PCW Advocate* and felt the need to defend the company. Back in February people were up in arms over Iomega's failure to deliver on a rebate offer (for more on that matter, see next month's *Consumer Watch*). But if Brown's story is any indication, Iomega's service may have improved. Brown had trouble with his Zip drive. "I called expecting to get a red ear," he says. But within 3 minutes he was speaking with a live person, who promised a replacement drive in four days. "To my surprise, I received the drive in three days, and it was working in 5 minutes."

ONLINE TRAVEL TROUBLES

IGNACIO ROMERO writes from the Big Apple to warn us of his experience buying airline tickets through Microsoft Expedia (www.expedia.com). "The day of my flight to South America arrived, but my tickets didn't," recalls Romero. "Airborne Express delivered them after the flight left." The tickets had been delivered to the wrong address prior to the departure date.

When Romero attempted to reschedule his trip, Expedia insisted he fork out $50 to change his flight. He refused to pay. "The fact that Airborne Express made the error is not my problem," protested Romero. We spoke to Erik Blachford, product manager for Microsoft Expedia, and he said that "in this case, the delivery service let us down, so we've agreed to issue Mr. Romero a full refund." Romero is happy with the outcome but told us he would never use Expedia again.

Think you've gotten a raw deal—or a great one? PCW Advocate *wants to hear the details at advocate@pcworld.com. We'll investigate complaints and publish items of the broadest interest. Aoife McEvoy is a staff editor for* PC World. ■

ILLUSTRATION: ROBERT NEUBECKER

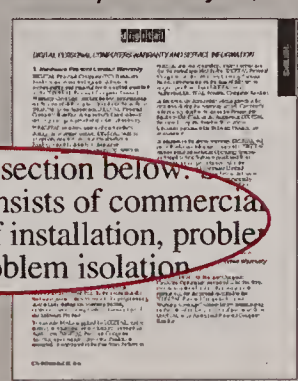
THE FINE PRINT

SOFTWARE SUPPORT: WHAT QUESTIONS CAN I ASK?

PC MAKERS THAT BUNDLE operating systems and applications on their machines usually support such software. But that support is probably more limited than what you'd get if you bought the software from its publisher. This warranty from Digital, for instance, offers free software support for 90 days. But look closely at the details to get the rundown on what's available to you.

1. If you're getting error messages involving the preinstalled OS and application software, or are having configuration problems or hardware-software conflicts, you're entitled to free help.

2. But if you need help creating, say, a formula in Excel, don't look to Digital. This isn't considered tech support; it's called tutorial help, and most warranties don't cover it.



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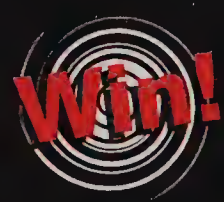

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* Estimated Street Price. All performance tests conducted by Matrox Graphics Inc. Windows 95 tests conducted on Dell XPS H266 configured with an Intel Pentium® II, 266 Mhz processor with 512K cache and 32 MB RAM. Matrox Mystique 220 Business, Diamond Stealth 3D 2000 Pro, STB Nitro 3D and ATI ProTurbo + PC2TV were configured with maximum memory configurations using driver revisions 3.63, 3.63, 4.03.00.3211, 1.52A and 4.03.2162 respectively. WinBench 97 business tests conducted at 1024X768 @ 16-bit at 75 Hz using small fonts under Windows 95.

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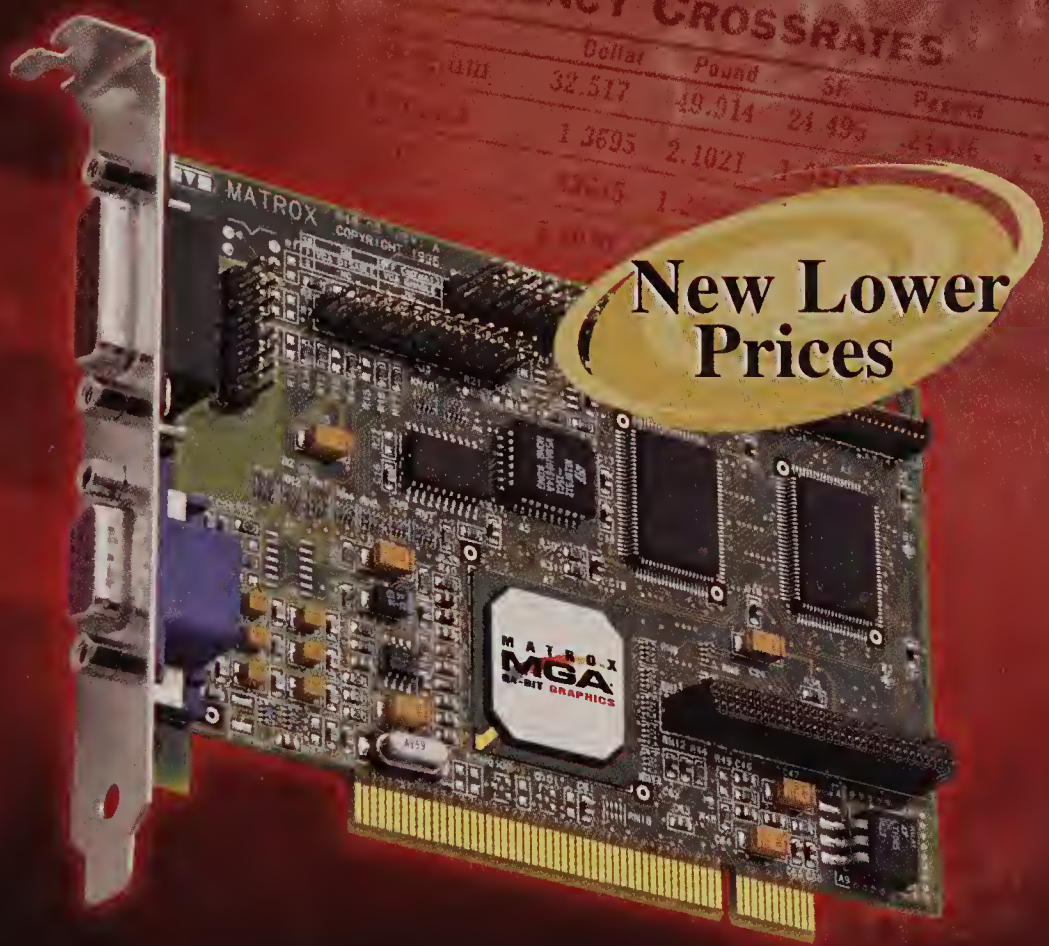

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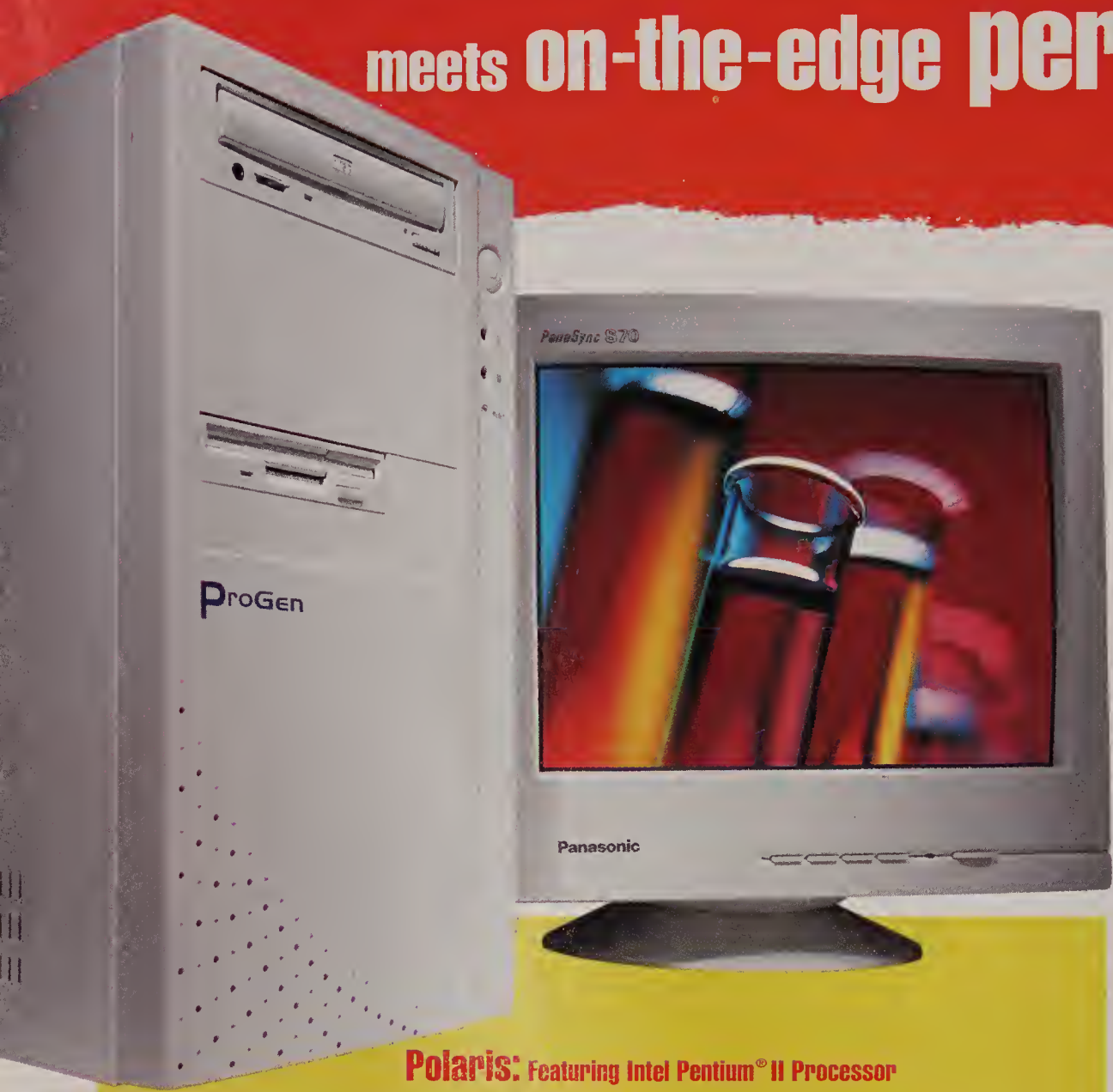

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Circle 184 on reader service card

Videoconferencing That Actually Works?

When you have to be in 30 cities in less than two weeks, airplane travel isn't good enough. Lisa Goodman discovered using a videoconferencing service is the way to go.

PHOTOGRAPH: RICH FRISHMAN

THE PROBLEM It's Tuesday; this must be Toledo. When you've got a travel schedule as punishing as Lisa Goodman's, it's hard to know where you are or where you're going. Goodman is the principal of Service Intelligence, a Seattle-based market research firm. Service Intelligence often trains and deploys researchers in 30 cities at a time—hence the grisly itinerary. But that was then. Today Goodman and her colleagues are staying home more often, thanks to the neighborhood business center. —*Editor*

We were run ragged, dealing with a grueling travel schedule. But how else could we get our work done? At Service Intelligence, we train field researchers to act as average consumers. We send these researchers to a client's chain of stores, for instance, so they can report on how those stores are doing in customer service or sales. For this research we need a diverse sample of people, in cities all over the United States. This pool of researchers is continually replenished so we can get a fresh perspective.

Unfortunately, this process required several of us every week to fly to as many as four or five cities each. It was tiring and time-consuming, not to mention expensive. In addition, when you're traveling, you're unproductive. We were often in a mad rush to produce the detailed, timely reports our clients expect.

There had to be a better way.

THE SOLUTION: RENT VIDEOCONFERENCING, DON'T BUY

VIDEOCONFERENCING SEEMED to be the answer. But it wasn't cost-effective to invest in a system that might be obsolete in six months.

So we went looking for a videoconferencing service that would handle the details. We wanted to be able to just pick up the phone and say when we needed the videoconferencing facility and which facilities in other cities we had to be linked to. We discovered that Kinko's, the business center chain, offers videoconferencing services at many of its sites around the world.

[Videoconferencing is currently offered at 155 of the 850 Kinko's business centers worldwide. Kinko's offers this service in partnership with Sprint. Each videoconferencing site operates on a dedicated Sprint T1 line at 384-kilobits-per-second transmission speeds, using either the H.320 coding standard or PictureTel's SG-3 standard. Each site is equipped with a PictureTel 4000 videoconferencing system, which includes a 27- to 35-inch color monitor; a Kodak video camera on top of the monitor; a document camera for televising whiteboards, overheads, and other presentations; a VCR for taping the conference; and a control panel for managing the cameras and monitor. —*Editor*]

Using the Kinko's service has helped us out in many ways. Having access to so many videoconferencing sites around the country makes it easy to connect with researchers and affiliates, even in remote locations. We now train researchers over the course of a couple of ▶

days, compared to the two weeks it used to take. And by eliminating all that travel time, we're able to deliver more immediate information to our clients. Best of all, videoconferencing complements our high-tech, progressive image.

We're saving a lot of money on travel as well. It often costs $500 to $1000 for a person to visit one city. When you've got to send people to 30 cities, the cost is staggering: A conservative estimate is about $15,000. By comparison, the Kinko's service costs $150 per hour per site. It's a fair price for the convenience and service we get, but it's not cheap—up to 30 sites at 90 minutes a session can add up to a minimum of $6750. Still, that's a savings of over $8000, which we can then pass on to our clients.

At each Kinko's site someone is on hand to help us get acquainted with the equipment; we can also request that the specialist stick around in case there's a problem. The PictureTel equipment is fairly easy to maneuver. Sometimes we ask for a PC so we can include a PowerPoint presentation as part of the videoconference.

The Kinko's facilities are good, but videoconferencing in general is still not a mature technology. The delayed response to movement and speech can be a little disconcerting. We didn't walk in expecting real-time television quality, though, and the convenience greatly outweighs the limitations. Maybe a few years from now, when the cost has dropped and the technology has improved, we'll install a videoconferencing system in our own offices. But for now we're grateful to be in the office and not on an airplane.

Edited by James A. Martin

James A. Martin is a PC World *contributing editor. If you've solved a problem in your business using a particular PC application or hardware device, we'd like to hear about it. We pay $300 for published columns. See page 14 for contact information.* ■

THE DETAILS

CONFERENCING AT KINKO'S

KINKO'S VIDEOCONFERENCING service costs $150 per hour per site for a session in which one Kinko's videoconferencing site is linked to another, and $205 per hour for each site when a conference involves more than two Kinko's locations. The company's videoconferencing locations can link to non-Kinko's sites. The same charges apply unless the non-Kinko's site does not support 384-kbps throughput using the H.320 videoconferencing standard or PictureTel's SG-3 coding. In that case, a conversion is required, for which there is an additional $30 per hour charge for each Kinko's site.

For videoconferencing reservations, call Sprint (800/669-1235); for more information, call 800/254-6567 or visit the Kinko's Web site at www.kinkos.com/products/catalog/video.

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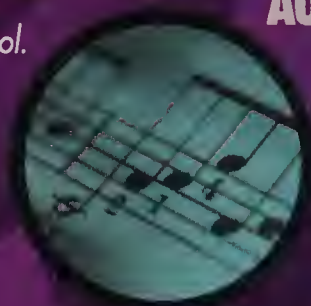

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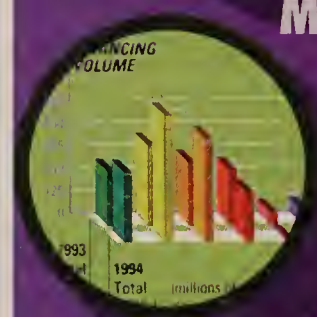

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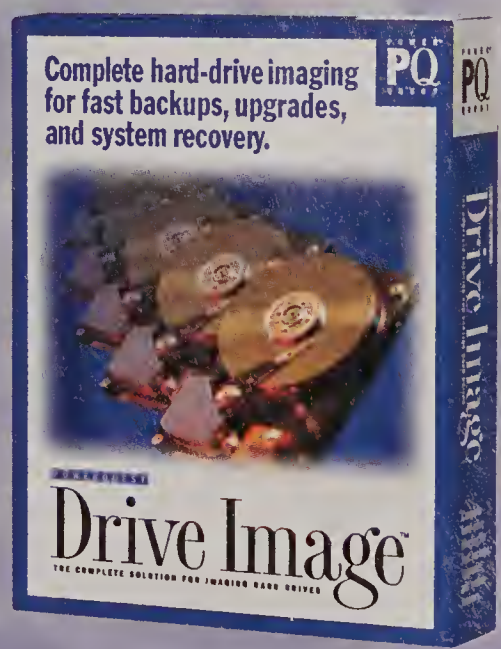

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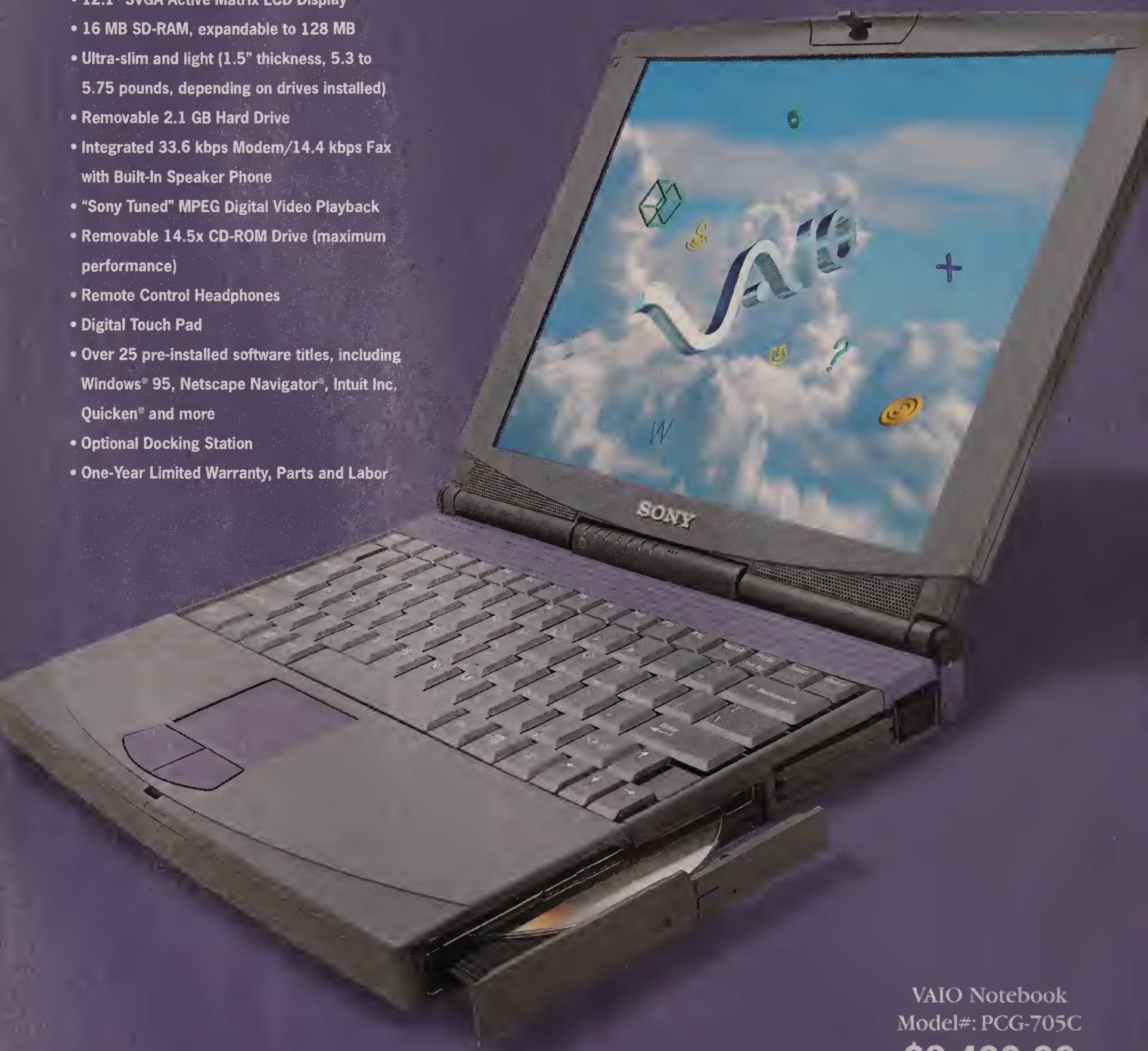

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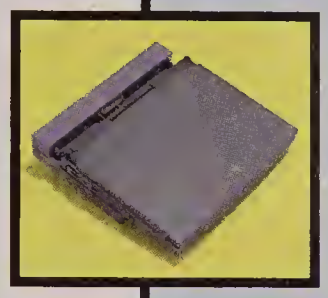

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Office 97 gets service ◆ SmartSuite 97 freshens up ◆ JavaScript afflicts browsers

Office Update—Old Patches, New Pack

AS WE GO TO PRESS, we're expecting the release of Microsoft's long-awaited Office 97 Service Release (www.microsoft.com/Office/Office97/ServiceRelease). But the 8MB collection of Office 97 enhancements and add-ons doesn't contain much that isn't already available on the Office 97 Web site. In fact, the Service Release's main point seems to be putting all the current fixes and add-ons into a single patch.

Among the improvements: A 623K file-format converter lets Word 97 users save documents in true Word 6.0/95 binary format (for details, see *Real Solutions,* September). Outlook, the personal information manager and e-mail program, receives a bug fix that stops it from adding bcc: addresses to the headers of Internet mail messages; and rules and a three-pane–view add-on make the package more competitive with stand-alone programs such as Eudora. Another utility allows you to send stand-alone views of Access database reports to coworkers.

If the multimegabyte Service Release download is more than you want to contend with, you can order a free CD-ROM version from 800/426-9400.

LOTUS SMARTSUITE 97 SEASONAL UPDATES

MICROSOFT'S ISN'T THE ONLY SUITE in need of a little maid service. Lotus has quietly posted a collection of minor fixes to problems in 1-2-3, Freelance Graphics, Approach, and Word Pro. To download the patches, go to the Lotus Support Services Web page (www.support.lotus.com), then click the *SmartSuite Interim Update Program* link. Until Lotus replaces its summer collection of patches with a promised fall edition, here's what you'll find:

1-2-3 A 1.8MB patch fixes miscalculations in four @functions—@IRR (Internal Rate of Return), @MIRR (Modified Internal Rate of Return), @NPV (Net Present Value), and @NSUM (Summation of every nth value).

Freelance Graphics A 1.8MB patch lets you import JPEG files and improves TeamMail, chart display, and printer support.

Approach A 2.7MB patch improves SQL and ODBC support and smooths data export when using macros.

Word Pro A 5.6MB update improves printing and file filters and adds a document viewer and import filter for Lotus Notes 4.*x*. A document viewer for cc:Mail lets you examine and import files created in Word Pro 96 and 97.

JAVASCRIPT SECURITY FLAW

GUESS WHAT? Another browser security hole. This time the culprit is the JavaScript language, which researchers at Carnegie Mellon University's Computer Emergency Response Team Coordination Center recently discovered to be less than secure (read the advisory at ftp://info.cert.org/pub/cert_advisories/CA-97.20.javascript). A flaw in the language permits hackers to track the URLs you visit, capture any passwords you enter into forms, and view the contents of cookie files stored on your computer.

It's unlikely that any sites bearing lethal JavaScript actually exist, but frequent Web surfers would be well-advised to protect themselves. The best way is to install an updated version of your Web browser that closes the hole. Netscape Navigator 3.03 and Communicator 4.01a (home.netscape.com/download/) and a patch to Internet Explorer 3.02 (www.microsoft.com/ie/security/bell.htm) plug the hole.

The beta version of Internet Explorer 4.0 available as we went to press, Preview 1, does not fix the problem. Until there's a version that does, you can protect yourself by disabling Internet Explorer's JavaScript support. Select *View•Options•Security,* click the *Custom* button, then click *Settings.* Under the Scripting heading and the Active Scripting subheading, click the *Disable* radio button, then click *OK* twice.

Files from this article are available on PC World Online (www.pcworld.com/files). Scott Spanbauer is a senior associate editor for PC World. ■

IN BRIEF

PaperPort Driver Update

DOES WINDOWS sometimes lose track of your PaperPort scanner? Visioneer says the latest version of the PaperPort 3.0 and 3.5 driver fixes the problem, and banishes modem conflicts too (ftp://web1.visioneer.com/ftp/pportdrv.exe).

NT Fix Blocks Server Crashes

MICROSOFT HAD EGG on its face when an enterprising researcher figured out that sending a particularly long URL to Internet Information Server 3.0 (Microsoft's Web server software bundled with Windows NT) halts your server. You'll find a fix (one of a dozen post-Service Pack 3 patches) for Intel-based systems at ftp.microsoft.com/bussys/winnt/winnt-public/fixes/usa/nt40/hotfixes-postSP3/iis-fix/iis-fixi.exe.

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Circle 103 on reader service card

TOP OF THE NEWS

Pentium II-300

The Latest May Not Be the Greatest

Systems with Intel's fastest CPU zip through business and multimedia applications. But Dell's Pentium II-266 does almost as well. As for the long-awaited Accelerated Graphics Port—benefits will come next year.

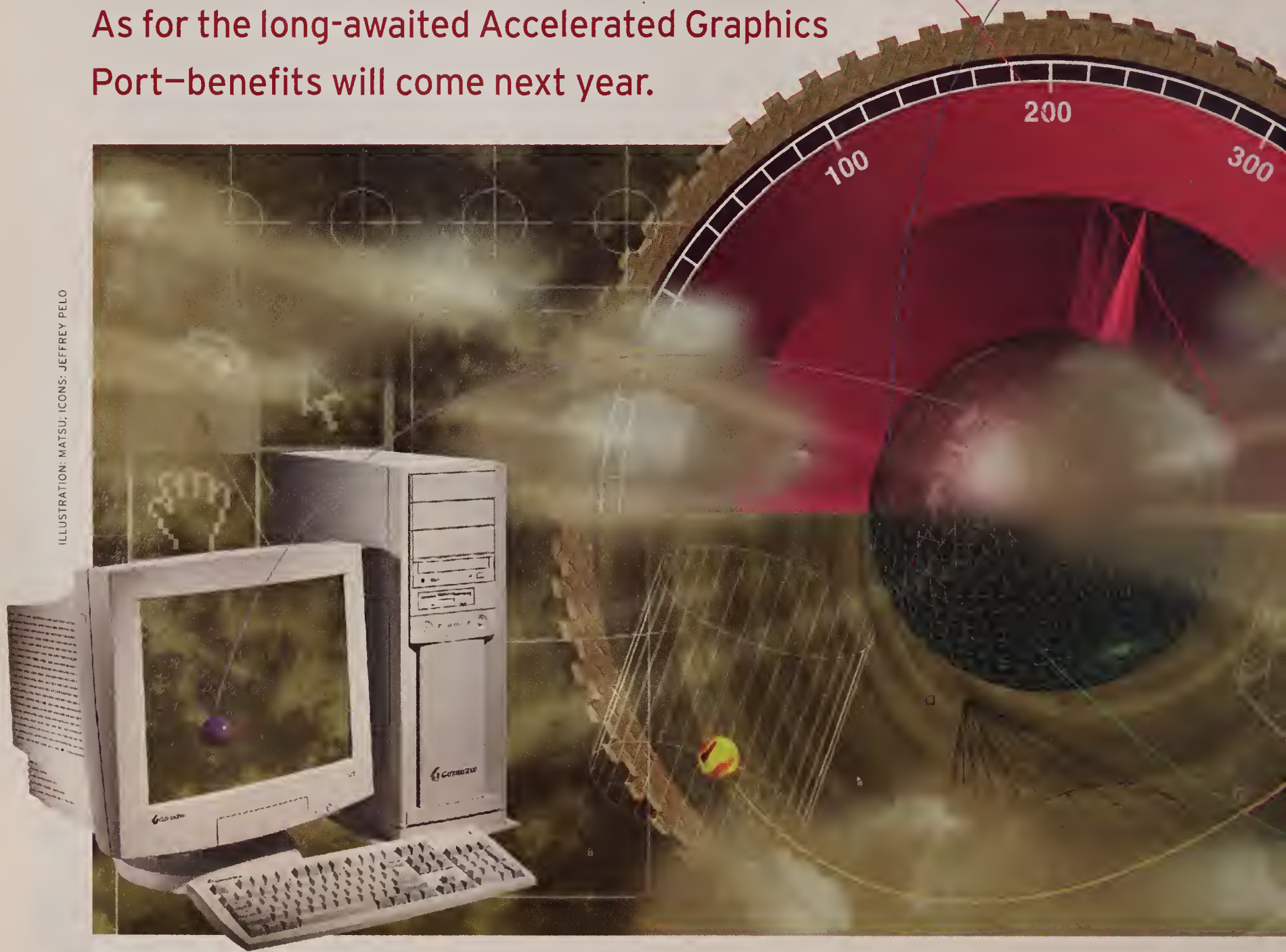


ILLUSTRATION: MATSU; ICONS: JEFFREY PELO

FOR YEARS you've been told that the next PC will be so great you can't resist. Higher speeds, more features, and, above all, new technologies will make that machine irresistible. Well, the next PC is here and you might want to resist it. The new Pentium II-300 machines aren't much faster than the less expensive Pentium II-266 systems. And the new technology du jour—Intel's long-awaited, highly touted Accelerated Graphics Port—is nothing to write home about. At least not yet.

For this review, we tested preproduction models of three Pentium II-300 PCs and one Pentium II-266 PC that use AGP technology and Intel's new 440LX chip set. The good news: Now is a great time to buy a fast multimedia system. The surprising news: You may not want the fastest of the fast.

EDITED BY
Charles Piller, Randy Ross, and Bill Snyder

BY A NOSE

IN OUR PC WORLDBENCH business application tests, the NEC Direction SPL 300, the AST Bravo MS-6300, and the Gateway 2000 G6 300XL—all Pentium II-300 systems—did not run significantly faster than the quickest Pentium II-266 machine we've tested, Dell's new $3099 Dimension XPS D-266. In fact, the fastest PII-300, the Gateway 2000, ran only 3 percent faster than the Dell Dimension in business applications. That's not enough of a difference to notice in everyday work.

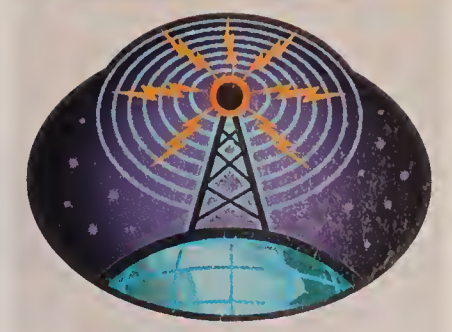
But the multimedia story was different. Some Pentium II-300 systems deserve consideration if you live and die by demanding multimedia applications, particularly Adobe Photoshop. The NEC Direction outperformed all the other systems we tested on Photoshop. But note this: It was equipped with a high-quality graphics card and 8MB of expensive on-board WRAM, while the Dell system had just 4MB of SGRAM.

AST's Pentium II-300, with 8MB of SGRAM on its graphics card, also performed faster than the Dell system in two multimedia tests, but wasn't as fast as the NEC on Photoshop. The Gateway 2000, which comes with 4MB of video memory, did only a little better than the Dell in two of the three multimedia tests, and the two machines performed virtually identically on the third. The lesson? If you need top-of-the-line multimedia performance, extra memory on a high-quality graphics card will make a big difference in certain apps.

Of course, a Pentium II-300 computer will cost you plenty, even without the extra video RAM. Street prices are a hefty $3799 for the Gateway 2000, ▶

PII-300 systems pictured from left to right: the Gateway G6 300XL and AST Bravo MS-6300.

JUST IN



Copy Software, Go to Jail

A BILL INTRODUCED in the U.S. House of Representatives would make it a felony to copy software for fun or profit. Under the proposed No Electronic Theft Act, anyone who reproduces ten or more copies of copyrighted software worth over $5000 could spend up to three years in jail. A second offense could put you away for six years. Make fewer copies and you still could be imprisoned for up to a year or fined—or both. Currently you're exempt from criminal charges unless you copy for profit.

Can the Spam

THE DATA PRIVACY ACT introduced in the House would require Internet service providers to tell customers which types of companies have access to their personal data. Customers could block release of their data if they wished. The bill would require that junk e-mail, or spam, include the sender's business name on the subject line. The bill would also order the computer industry to prepare voluntary guidelines for implementation. One consumer group isn't impressed. "It's not clear to me that the self-regulatory approach will be enough," says Diedre Mulligan of the Center for Democracy and Technology. ▶

INTERNET

GET UP-TO-THE-MINUTE NEWS, including RealAudio daily news summaries, hot game demos, the latest reviews, and productivity shareware, at PC World Online. Just point your browser to www.pcworld.com/news.

PII-300: New Leader by a Small Margin

PII-300 AND PII-266: NECK AND NECK

SYSTEMS	CPU	RAM (MB)	PC WorldBench score
Gateway 2000 G6 300XL	Pentium II-300	64	272
AST Bravo MS-6300	Pentium II-300	64	270
NEC Direction SPL 300	Pentium II-300	64	270
Dell Dimension XPS D-266	Pentium II-266	64	264
Average of six desktops	Pentium II-266	64	261
Average of ten desktops	Pentium II-266	32	260
Average of four desktops	Pentium II-233	32	248

All systems had 512K of secondary cache.

Faster ◀ Application test times ▶ Slower

Minutes 0 10 20

Word 7.0 for Windows 95 · Excel 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · Paradox 5.0 for Windows · WordPerfect 6.1 for Windows · 1-2-3 release 5 for Windows

NEC PII-300: THE MULTIMEDIA CHAMPION

SYSTEMS	CPU	Graphics memory on card	Director movie viewing (frames per second) (Higher is better)
NEC Direction SPL 300	Pentium II-300	8MB WRAM	97
AST Bravo MS-6300	Pentium II-300	8MB SGRAM	97
Gateway 2000 G6 300XL	Pentium II-300	4MB SGRAM	88
Dell Dimension XPS D-266	Pentium II-266	4MB SGRAM	87
Average of six desktops	Pentium II-266	[1]	93
Average of three desktops	Pentium II-233	4MB VRAM	91

[1]Five systems had 4MB, one had 8MB.

Faster ◀ Application test times ▶ Slower

Minutes 0 1 2 3 4

Photoshop image editing · Ray Dream Studio 3D redraw

How We Test

Business applications: We tested all systems with PC WorldBench, PC World's Windows 95 application-based benchmark. Higher scores are better. For a description of PC WorldBench 1.0 tests, see PC World Online (www.pcworld.com).

Multimedia applications: We tested each system using a series of MMX-enabled applications. In Adobe Photoshop 4.0, we time several image editing operations. In Fractal Ray Dream Studio 4.1, we time how long it takes to redraw rendered 3D scenes at two levels of complexity. In Macromedia Director 5.0, we play a graphics-intensive Director executable file.

Data based on testing conducted by the PC World Test Center. All rights reserved.

$3499 for the NEC, and $4080 for the AST—that's $400 to $1000 more than the speedy Dell system. (Dell also offers a Pentium II-300 version of its Dimension machine for $3299.)

ABC'S OF LX AND AGP

THERE IS ONE new technology that you should pay some attention to: Intel's new 440LX chip set. Whether you're buying a Pentium II-266 or Pentium II-300 system, make sure it has this chip set. For now, the issue isn't performance; it's investment protection.

PC World previously tested six Pentium II-266 systems—all of them based on the older FX chip set and using 64MB of RAM—and arrived at an average PC WorldBench score of 261. For ten other Pentium II-266 systems with 32MB of RAM, the average score was 260. Those numbers are quite close to those of the Dell Dimension XPS D-266 and the Pentium II-300 PCs that we tested for this article.

The LX chip set—which you'll find on more and more Pentium II motherboards this year—helps protect your PC investment. It supports four new technologies: Ultra-DMA hard drives, Instant On power specs, Synchronous DRAM, and Accelerated Graphics Port. The older FX and TX chip sets don't support AGP, although the TX does support the other three technologies.

Ultra-DMA hard drives are between 2 percent and 10 percent faster than Enhanced IDE drives. The Instant On technology lets your PC fall into an efficient sleep mode, then wake up to do an automated task (like downloading a Web page) or to resume work where you left off, with all apps running. SDRAM is a new type of memory that's slightly faster than the widely used EDO RAM. All four systems tested here have Ultra-DMA hard drives and 64MB of SDRAM.

Accelerated Graphics Port technology, which for more than a year has been billed as a major advance, provides an internal, direct route between a graphics card and the PC's main memory. An AGP-compliant card, used in a system with the 440LX chip set, is designed to speed up sophisticated graphics rendering, such as in a 3D game with many textures, a virtual reality scene, or a complex photo in an image editing application.

While a PCI graphics card works with your system's

33-MHz PCI bus (a pipeline it shares with other components), AGP is a 66-MHz dedicated bus just for graphics. However, almost none of the software programs you use today will push a graphics card hard enough to really take advantage of AGP, and none of it is written specifically to harness the technology. "AGP is a foundation that you can develop new software for," says Joe Van De Water, Intel's marketing manager for the 440LX chip set. "But the Pentium II processor with AGP is not going to run Quake or Excel better."

Mike La Tondre, Intel's engineering manager for the 440-LX chip set, is even more blunt: "I don't expect you'll see much improvement with old software," he says. And we didn't. To see what an AGP card would do for popular software, we ran the AST Bravo MS-6300 through ten graphics-intensive tests under Windows 95 OSR2.1. The tasks were done first with an AGP card and then with a PCI graphics card, both from ATI. Both production-level cards had 4MB of SGRAM. The tasks included playing sequences from 3D games, running an AVI file using Windows 95 Active Movie, using a Web browser to look at an animated VRML world, and constructing a multimedia Microsoft PowerPoint presentation. In every task, the Bravo's performance was virtually identical with the AGP and PCI graphics cards.

As Intel will tell you, AGP is a work in progress. Software developers are just now writing applications that will take advantage of it—and these apps won't arrive in force until 1998 (see "AGP Will Make a Difference—Next Year"). And graphics board vendors have just started shipping the first AGP cards. As with today's PCI accelerators, developers are able to make small changes that make one card faster than another on certain tasks. But until more AGP cards ship and are tested, sorting out which ones are best simply by reading an ad or perusing a spec sheet will be virtually impossible.

Almost none of today's software takes advantage of Accelerated Graphics Port.

Above: Dell's speedy $3099 D-266.

The bottom line? There is absolutely no reason to run out and buy a new computer just to take advantage of Accelerated Graphics Port. These cards add $150 to $200 to the cost of a system and won't benefit you much right now. The four machines that we tested for this review are good for multimedia, but AGP doesn't play a role in their success.

DOWN TO BUSINESS

THE NEW Pentium II-300 systems make quick work of business and multimedia applications. In our PC WorldBench tests, which measure performance in common business apps, the Gateway G6 300XL scored 272, the highest we've ever recorded. It was followed by the AST Bravo MS-6300 and the NEC Direction SPL 300, each of which scored 270.

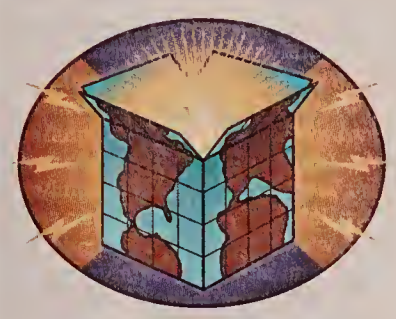
But let's put those scores in perspective. The 266-MHz Dell Dimension XPS D-266 earned a score of 264, only 3 percent lower than that of the Gateway Pentium II-300. (By comparison, the average PII-233 with 32MB of RAM scored 248, and the average PMMX-233 scored 238.)

Are you surprised by the minimal difference in performance between the Pentium II-266 machine and the PII-300s? Industry analysts aren't. "Just cranking up the processor clock doesn't result in a linear improvement in performance," says Dean McCarron, principal analyst at Mercury Research. There are a couple of issues to remember, he says. First, the Pentium II chip's secondary cache operates at half the speed of the processor, so a PII-266's cache works at 133 MHz and a PII-300's at 150 MHz—not a huge difference. Second, today's Pentium II PCs have a 66-MHz system bus, which most of the components use to communicate with the CPU. Until the system bus gets faster, it remains a performance roadblock.

Analysts predict that PC speeds will improve sig- ▶

Merger Could Mean Lower-Cost PCs

ONE OF INTEL'S CHIEF rivals in the CPU market, Cyrix, plans to merge with another chip maker, National Semiconductor, and focus on manufacturing processors for low-cost computing devices such as basic home PCs, Network Computers, and Internet appliances. Cyrix will continue to make its MediaGX processors, which run Compaq's line of low-cost Presario home systems, and 6x86MX processors, which compete with Intel's high-end Pentium II and Pentium MMX chips. Cyrix and National Semiconductor also announced that they intend to use an improved version of the MediaGX chip for very low-cost home computers—systems that may cost as little as $700 with a monitor.



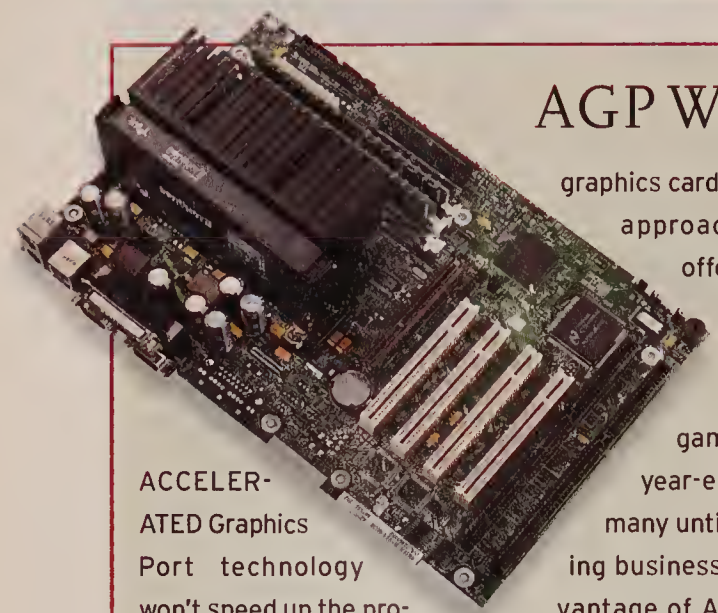
TidBytes

SURFING MOUSE: Kensington Microware's $50 Internet Mouse has four programmable buttons and software features that let it scroll up and down and zoom in and out. If you click the two top buttons at the same time, a pop-up menu lets you launch a browser and view favorite Web sites.

DICTATE FOR LESS: Dragon Systems slashed the list price of its breakthrough dictation package, NaturallySpeaking Personal Edition, from $695 to $349, for a street price of about $200. In addition, IBM announced that its ViaVoice, the first competing product, will sell for $99, down from a previously announced $199.

PHOTOGRAPH: JOHN GREENLEIGH

AGP Will Make a Difference—Next Year



ACCELERATED Graphics Port technology won't speed up the programs you use now (see chart), so what will a PC with Intel's 440LX chip set and an AGP graphics card give you today? Mostly investment protection. But in the future, 3D software for games and business could look radically different as AGP comes into its own.

Here's why: With a PC sporting the 440LX chip set and an AGP card, there's a direct route from the graphics card to the system's main memory. So software developers can build programs much richer than those designed for PCs with 4MB or 8MB PCI-based graphics cards—3D games should approach arcade quality, offering lush textures and impressively fast redraw.

The first few AGP games will show up by year-end, but don't expect many until mid-1998. Upcoming business apps will take advantage of AGP too, but only a few will be available in the near future. There's talk of 3D interfaces to mainstream productivity apps, but so far there hasn't been much more than talk.

AGP Wish List

HERE'S A PEEK at what's coming in 1998:

❒ Revamped desktop publishing and graphics programs could use AGP to quickly draw and edit images and pages. That means less waiting and perhaps more complex effects.

❒ New data-mining or data visualization programs—still works in progress—will take large chunks of information from corporate databases and render them in 3D form on your screen.

❒ More Web pages will use VRML to create 3D environments. A PC with better graphics performance will help you move quickly and smoothly through VRML pages. For example, a Web page with VRML can let you explore a 3D shopping mall or brew pub, or give you a rich visual lesson in how the heart works.

❒ Technical training for employees will be possible from a Web site, Intel says. For instance, a company could post a complex 3D explanation of a particular assembly process.

And note this: A new Intel chip set—the 440BX—and even faster AGP implementations are expected to arrive in PCs in 1998, along with the new software.

AST BRAVO MS-6300	PowerPoint 97 (sec)	Terracide (frames per sec)	VRML (frames per sec)
With 4MB AGP card	139	38	48
With 4MB PCI card	139	37	48

HOW WE TEST Each application is tested using a PCI card and an AGP card, both from ATI. In PowerPoint 97 we import bit maps, change fonts, apply effects, and perform related tasks. We use a special version of Terracide equipped for frame counting. For VRML, we open a virtual world with animations in Netscape Navigator 3.01. Data based on testing conducted by the PC World Test Center. All rights reserved.

nificantly when Intel ships yet another chip set—the 440BX—which is expected to appear in PCs in fall 1998. The BX chip set allows for a 100-MHz system bus, and 100-MHz SDRAM is expected to ship at the same time. Communication between the CPU and other components will speed up considerably, which should result in noticeable performance gains, says Peter Glaskowsky, senior analyst for *The Microprocessor Report*.

Some of the Pentium II-300 systems we tested shined in multimedia performance, compared to earlier PII-266s. But this wasn't simply because of their CPUs: More system and video memory helped, too.

FASTEST MULTIMEDIA

IN PC WORLD'S MMX benchmark tests, the NEC Direction SPL 300 was fastest overall, thanks to its quick Number Nine graphics card with 8MB of WRAM. The NEC ran 97 frames per second on the Macromedia Director test (higher is better); it completed the Photoshop test in 53 seconds (lower is better) and the Ray Dream Studio 3D test in 44 (lower is better). Compare these scores to the average for Pentium II-266 machines with 32MB of RAM, which ran 93 fps in Macromedia Director and handled the Photoshop and Ray Dream tests at 98 and 57 seconds, respectively. That means the NEC runs about 4 percent faster in Director, a whopping 85 percent faster in Photoshop, and 30 percent faster in Ray Dream. But keep in mind that the NEC has 64MB of RAM compared to the PII-266s' 32MB; the added memory helped raise the Photoshop score in particular. The NEC also did particularly well on one of the three tasks in the Photoshop test—the Gaussian blur filter operation. Its Number Nine graphics card contains a display list processor that apparently speeds up tasks involving a quick succession of small graphics commands, says Craig Jones, the card's product manager.

The AST Bravo MS-6300 performed almost identically to the NEC, but it was slightly slower in the Photoshop test. The Gateway G6 300XL was slower than either the NEC or AST systems in Director and Photoshop, but it's still a fast multimedia performer.

Now, consider the Dell Dimension XPS D-266, a Pentium II-266 PC: It ran a bit slower than Gateway 2000's Pentium II-300 on the Photoshop test, but it was considerably slower than NEC's Pentium II-300 on the same test. The Dell tested to within 10 percent of all the Pentium II-300s on the Ray Dream and Director tests. These differences are a concern if your job primarily involves high-end multimedia work, but for other people the Dell Pentium II-266 is a better buy.

THE FINE PRINT

ALL FOUR PCS are outfitted for people who want a top multimedia system: Each has a 12X/24X CD-ROM drive.

The NEC Direction SPL 300 provides you with a 17-inch monitor, a 6.4GB hard drive, and a Number Nine Revolu-

PHOTOGRAPH: JOHN GREENLEIGH

tion 3D AGP graphics card with 8MB of WRAM, as well as an Iomega Zip drive.

The Gateway G6 300XL comes with an impressive 19-inch monitor that fits in the desk space of a typical 17-inch model, an STB Velocity AGP graphics card with 4MB of SGRAM, an 8GB hard drive, and a Telepath 56-kbps modem with 3Com/U.S. Robotics' x2 technology. This system is pricey, but the monitor and excellent Boston Acoustics sound system with subwoofer will please.

The AST Bravo MS-6300 gives you the least for your money in terms of configuration: The system includes a 17-inch monitor, an ATI Rage II+ 3D AGP graphics card with 8MB of SGRAM, and a 4.3GB hard drive. The AST does have an easy-open chassis, plus noise reduction technology that makes the machine unusually quiet. But that doesn't justify the cost: The 266-MHz Dell system packs in more than the AST and costs $981 less.

Despite its relatively low price, the Dell Dimension comes with top-quality components: You get a 17-inch monitor, an STB Velocity AGP graphics card with 4MB of SGRAM, an 8.4GB hard drive, a 12X/24X CD-ROM drive, and a U.S. Robotics Sportster 56K modem.

Finally, consider system reliability and support. Dell earned a top rating for both in *PC World*'s ongoing reader poll. While Gateway 2000's support was highly rated, its system reliability was rated only fair. AST and NEC were rated poor in both categories.

THE BEST BETS FOR NOW

ADD IT ALL UP and it's clear that the Pentium II-300s are the best machines for the toughest multimedia jobs. But for most people, Pentium II-266s are the better buy.

There's not much point in delaying your PC purchase, unless you can wait until late in the year. The price of budget-friendly Pentium MMXs will continue to fall in the coming months. However, Intel won't be cutting PII-266 chip prices until November, so you won't see any huge PC price drops until Christmas, says Linley Gwennap, editor of *The Microprocessor Report*.

So resist buying what you don't need. If you're in the market right now and your job doesn't depend on the absolutely fastest multimedia performance, a 266-MHz Pentium II with the 440LX chip set may be best—it's a fast machine that won't soon be outdated.

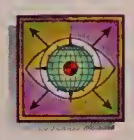
—Laurianne McLaughlin

> The NEC Direction SPL 300 was fastest overall in multimedia, thanks to its quick Number Nine graphics card with 8MB of WRAM.

- **AST Bravo MS-6300 $4080** street; 800/876-4278; www.ast.com
  READER SERVICE NO. 787
- **Dell Dimension XPS D-266 $3099** street; 800/388-8542; www.dell.com
  READER SERVICE NO. 788
- **Gateway 2000 G6 300XL $3799** street; 800/846-2000; www.gw2k.com
  READER SERVICE NO. 789
- **NEC Direction SPL 300 $3499** street; 888/863-2669; www.nec-computers.com
  READER SERVICE NO. 790

WEB BROWSER

Need a Job? Hit the Net



FOR MOST OF US, job hunting ranks right up there with a trip to the dentist or filling out tax forms. The World Wide Web seems like a good place to look for help—until you get 4600 hits on a Yahoo search for 'employment', that is.

But don't turn off the computer just yet. A number of well-organized Web sites can take some of the pain out of looking for a job. And if you're thinking about moving to another part of the country, searching for work online is one heck of a lot easier than subscribing to a slew of out-of-town newspapers.

America's Job Bank (www.ajb.dni.us), with 200,000 listings collected from 1800 employment offices around the country, is one of the best job search sites on the Web. It's intelligently planned: Jobs are divided into 40 categories and a number of subcategories, and listings can be sorted by city, salary, or amount of experience required.

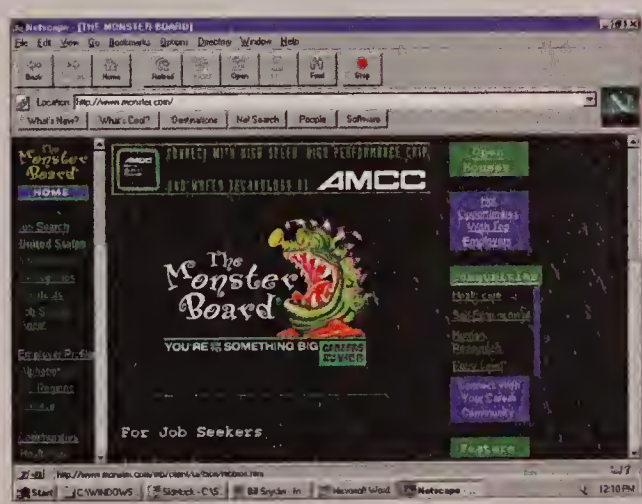
CareerMosaic (www.careermosaic.com) offers 20,000 jobs, including many foreign listings. Its search mechanism requires a little more work than that of America's Job Bank, but it lets you zero in on a specific type of job you might otherwise miss.

Many sites, including CareerMosaic and The Monster Board (which boasts 50,000 jobs at www.monster.com), offer free career counseling and will e-mail job listings to you.

I decided to take advantage of one such tool, Career Builder's Personal Search Agent (www.careerbuilder.com). After choosing a job category, regional preferences, and keywords, I was promised e-mail with job listings that fit my profile. After waiting ten days I received only one job listing in my chosen field of journalism, but when I posed as a wanna-be accountant, 30 listings were returned in a few days.

A lot of the sites I visited were geared to high-tech openings. In early August, Jobs America (www.jobsamerica.com) listed 383 jobs for Advanced Micro Devices alone. But even if you're not an engineer, using the Web effectively will keep your next job search from feeling quite so much like a root canal.

—Daniel Meisler



THE MONSTER BOARD: 50,000 listings take some of the pain out of job hunting.

Pentium MMX-233 Notebooks Break Speed Records

NOTEBOOK manufacturers have been fighting a losing battle to build portable systems that can match high-end desktop PCs in performance. Though vendors load new notebooks with oversize active-matrix color screens, multigigabyte hard drives, and a profusion of other premium features, processor power has generally lagged behind. Until now, the fastest Intel-compatible notebooks have used Pentium MMX-166 CPUs—not exactly cutting-edge technology considering that desktop PCs based on the new Pentium II chip have raced to 300-MHz clock speeds.

Intel's new mobile Pentium MMX-233 CPU narrows the performance gap. Designed for use in notebooks, the new 233-MHz chip is at the heart of the three fastest notebooks we have ever tested—preproduction units from Gateway 2000, NEC, and Quantex. In addition, we saw early Pentium MMX-233 notes from IBM and Toshiba, but neither of those were available in time for benchmark testing. Prices range from $3349 for Quantex's Meridian H233 to $7000 for IBM's top-of-the-line ThinkPad 770.

Our testing of the PMMX-233 models showed a moderate increase in speed over the fastest portable PCs currently available. Based on previous experience, we expect that the shipping notebooks will be slightly faster than the preproduction units we tested. With its PC WorldBench score of 242, even the fastest of the PMMX-233 machines—Gateway 2000's Solo 9100-233—was only about 10 percent quicker than the speediest PMMX-166 notebooks we've tested, from Micron and Gateway. Of the other PMMX-233 notebooks, NEC's Versa 6230 bested the top Pentium MMX-166 units by about 5 percent, and the Quantex Meridian H233 nosed them out by 3 percent. (The Meridian's slower finish is understandable, though, because it had 16MB of RAM, versus 32MB for the other notes.)

FASTEST of the fast: Gateway 2000's Solo 9100-233 notebook captured top honors in our lab tests.

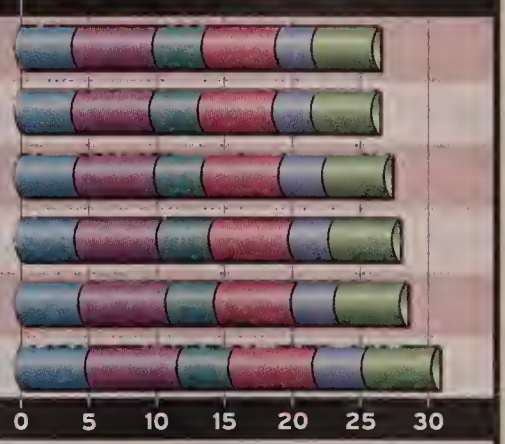
Still, the first PMMX-233 notebooks, unlike many portables, perform on par with comparably equipped desktop PCs. The Solo 9100-233, which incorporates beefy features such as 4MB of video memory and 512K of secondary cache, completed our tests in a virtual tie with the fastest PMMX-233 desktop we've tested, Dell's Dimension XPS M233s.

LOWER WATTAGE, LONGER LIFE

WHY DO THE FAST new CPUs take a while to make their way into portable systems? The desktop versions of the chips are power hogs that quickly deplete a notebook's battery power. As a result, Intel must spend additional time developing mobile versions of the processors that require less juice. Most of the notebooks we've tested based on desktop PMMX-200 chips haven't even eked 2 hours of power out of a battery charge. Moreover, the portable PCs based on desktop PMMX-200 chips lagged the fastest units ▶

PMMX-233 NOTES: FASTEST TO DATE

SYSTEMS	CPU	RAM (MB)	PC WorldBench score
Gateway 2000 Solo 9100-233	Pentium MMX-233	32	242
Average of three desktops	Pentium MMX-233	32	240
NEC Versa 6230	Pentium MMX-233	32	231
Quantex Meridian H233	Pentium MMX-233	16	227
Micron Transport XKE P166 A[1]	Pentium MMX-166	32	221
Average of six notebooks	Pentium MMX-166	32	204



All systems had 512K secondary cache.

Word 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · WordPerfect 6.1 for Windows · Excel 7.0 for Windows 95 · Paradox 5.0 for Windows · 1-2-3 release 5 for Windows

[1]Tied with Gateway 2000's Solo 9100-XL for fastest notebook previously tested.

HOW WE TEST All systems are tested with PC WorldBench, *PC World*'s application-based benchmark. Higher PC WorldBench scores are better. For a description of PC WorldBench 1.0 tests, see PC World Online (www.pcworld.com/testing). Data based on testing conducted by the PC World Test Center. All rights reserved.

PHOTOGRAPH: JOHN GREENLEIGH

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Model	P50	P70	PF70	P21
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Max. Res. NI (H X V)	1280 X 1024	1600 X 1280	1600 X 1280	1800 X 1440
H-Scan (kHz)	30 - 70	30 - 86	30 - 86	30 - 115
Viewable Area	14.0"	16.0"	15.9"	20.0"

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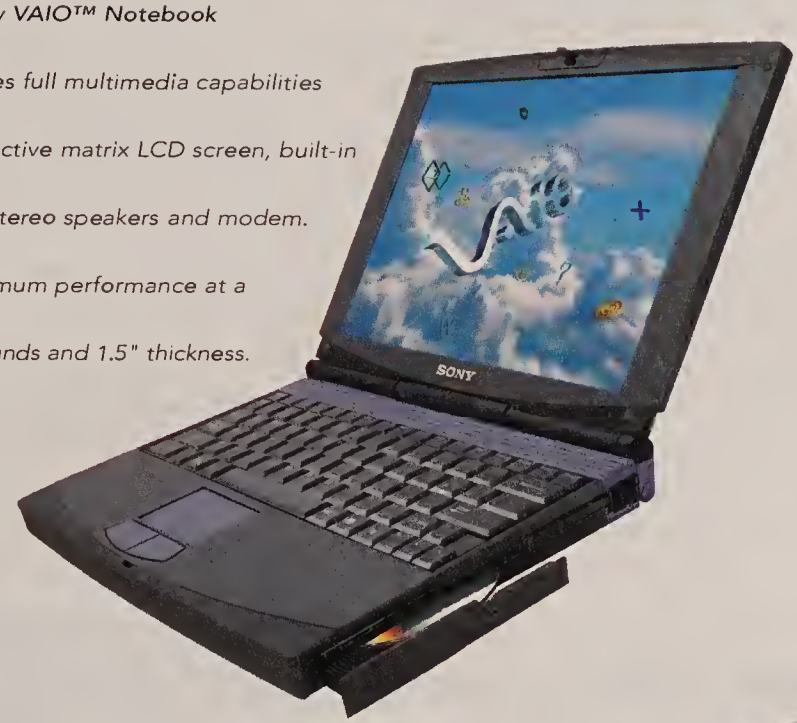

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SONY

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based on mobile PMMX-166 processors in our tests.

For the mobile version of the Pentium MMX-233 processor, Intel came up with a design that consumes just 5.5 watts of power (compared with about 17 watts for the desktop CPU). In our tests, such efficient use of power translated into battery life that ranged from respectable to impressive—more than 4.5 hours for the Gateway 2000 machine, over 3.5 hours for the NEC, and nearly 5 hours for the Quantex.

PACKED OR PETITE?

BEYOND THEIR USE of the PMMX-233 processor, most of the notebooks we tested also share a similar design philosophy: Cram in as much neat stuff as you can—weight and price be damned. Gateway 2000's Solo 9100-233, NEC's Versa 6230, and Toshiba's Tecra 750CDT all have big, beautiful 13.3-inch active-matrix screens, and each has one feature that sets it apart from run-of-the-mill notebooks. For example, the $4999, 10.4-pound Gateway lets you use both its CD-ROM drive and floppy drive at the same time; and the $5299, 9.8-pound NEC has an optional LS-120 drive that handles standard 1.44MB floppies plus those that hold 120MB of data. The $6799, 10.7-pound Toshiba comes with a candy bar–size, clip-on video camera for videoconferencing and image capture.

POWER saver: The mobile PMMX-233

IBM's new $7000 ThinkPad 770 ups the ante with a 14.1-inch active-matrix screen (one of the first of that size available in any notebook) and an optional DVD-ROM drive.

The one notebook we review here that doesn't subscribe to the more-is-never-enough philosophy is Quantex's Meridian H233, one of the company's first portable PCs. The configuration we tested sported a smaller 12.1-inch screen and little in the way of flashy extras. But the $3349 price is certainly right, and at 7.6 pounds the Meridian is positively petite compared with the other notebooks here.

Even if your notebook needs are modest and these prices seem steep, the 233-MHz Pentium MMX is still good news, because it should drive down prices for portables based on lesser processors. And if 233-MHz MMX performance in a mobile PC sounds a little humdrum to you, wait until the first half of 1998. That's when Intel plans to deliver the first Pentium II processors designed for notebooks.

—Harry McCracken

- Gateway 2000 Solo 9100-233
Gateway 2000, 800/315-2536, www.gateway.com
Price: $4999 as tested
READER SERVICE NO. 781
- IBM ThinkPad 770
IBM, 800/426-2968, www.us.pc.ibm.com
Price: $7000 as discussed
- NEC Versa 6230
NEC, 888/863-2669, www.nec-computers.com
Price: $5299 as tested
READER SERVICE NO. 782
- Quantex Meridian H233
Quantex, 800/896-4898, www.quantex.com
Price: $3349 as tested
READER SERVICE NO. 783
- Toshiba Tecra 750CDT
Toshiba, 800/334-3445, www.computers.toshiba.com
Price: $6799 as discussed
READER SERVICE NO. 784

PHOTOGRAPH: (TOP) JOHN GREENLEIGH; (BOTTOM) GLENN CORMIER/IN SITE

Satellites, Radio, and Super Wireless for New High-Speed Net Access

TIRED OF doing the Web crawl? Your telephone and cable TV companies are testing high-speed solutions to the problem—ranging from Asymmetric Digital Subscriber Line (ADSL) phone service to cable modems—that may come to your street one day. But you might be in for a long wait if you live in a crowded metropolis where upgrading telecommunications infrastructure and wiring is difficult, and especially if you live in a rural area where premium communications services are often rolled out last (or not at all).

New wireless technologies—satellite, radio, and super wireless—offer more options. All these digital technologies provide comparable bandwidth, are competitively priced, and install faster than many existing wired solutions. But some of these wireless technologies may take a year or longer to get to your neighborhood.

DOING DISHES

RIGHT NOW, HOWEVER, you can get 400-kilobits-per-second downloads from the Internet and access to 200 TV channels anywhere in the United States with the DirecDuo satellite dish from Hughes Network Systems. The DirecDuo combines the television features of Hughes's DirecTV and Internet features of DirecPC dishes, which have been available separately for a year. The DirecDuo is slicker—and more expensive—than the other dishes that Hughes offers.

You can buy DirecDuo from stores like CompUSA for $899 to $999, depending on the extra television features you crave. Internet access is available in at least four pricing ▶

FAST WIRELESS Net access options, such as this 400-kbps Hughes DirecDuo satellite dish, are coming to a rooftop near you.

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MAKING WAVES: WIRELESS, HIGH-SPEED NET ACCESS

TECHNOLOGY	Estimated costs	Estimated download/ upload speed	Availability	Comments
Hughes Network Systems DirecDuo satellite	$300 installation fee[1]; $899 to $999 for dish; $20 to $130 per month[2]	400 kbps/33.6 kbps (via analog modem)	Anywhere	Combines Internet and TV access even in remote areas.
Super wireless	$199 installation fee[1]; $50 per month for hardware and Internet access[2]	500 kbps/33.6 kbps (via analog modem)	New York now; other cities in 1998	Least costly wireless option for Internet access, but limited availability.
WinStar digital radio	No installation fee; $225 to $400 per month for hardware and Internet access	1.544 mbps/1.544 mbps	9 cities now; total of 30 by summer 1998	Fastest wireless technology available today.
Teledesic satellite	$1000 for dish; other costs not set at press time	64 mbps/2 mbps	Rollout planned for 2002	Potentially the fastest two-way wireless Internet access.
Motorola Celestri satellite	$750 for dish; other costs not set at press time	16 mbps/2 mbps to 10 mbps	Rollout planned for 2002	Low-cost TV and Internet access anywhere on the globe.
56-kbps modem	$175 for modem[1]	56 kbps/33.6 kbps	Most ISPs support one or both competing 56-kbps technologies	Lack of 56-kbps standard a problem.

[1] Does not include installation or monthly costs of an additional phone line for analog modem.

[2] Does not include cost of TV service.

packages that start at around $20 per month and head skyward to $130 a month for unlimited access. You pay extra for HBO, the Movie Channel, and other premium services.

Then there are the installation costs. If you're comfortable standing on a ladder drilling lag bolts into your roof, you could probably install the DirecDuo dish yourself in a couple of hours (it comes complete with hardware for mounting the device and connecting it to your PC and television).

I opted instead for the standard $249 installation, but I still had to add a 16-bit adapter to my computer and load the software myself. It was worth the effort. Once the DirecDuo received a Web page request (which still must travel upstream at 33.6 kbps through a modem), the page popped onto my screen.

Price Waterhouse's *EMC Technology Forecast: 1998* report claims that by year-end, other providers—such as ASkyB and EchoStar—will launch the same type of high-altitude geosynchronous Earth-orbit (GEO) satellites that Hughes uses. Still other companies plan to blanket the globe with low-Earth-orbit (LEO) satellites that are better for two-way Internet access.

By 2002, start-up Teledesic, a venture spawned by Bill Gates and cellular pioneer Craig McCaw, plans to circle the Earth with 288 LEO satellites providing as much as 64 megabits per second of downstream bandwidth and 2 mbps upstream for less than the cost of GEO service. By then, Motorola hopes to have its Celestri system working. A hybrid combining the best of GEO and LEO services, Celestri will offer 16-mbps downloads and 2- to 10-mbps uploads at even lower prices, according to Motorola.

> By 2002, **Motorola hopes** to offer a satellite service that will download Web pages **at speeds of up to 64 megabits per second.**

SUPER WIRELESS

BUT LESS EXPENSIVE wireless alternatives are already available to some people. The United States' first Local Multipoint Distribution Service using super wireless technology has been deployed in the New York metropolitan area by CellularVision USA. Consumers pay only $50 a month for its CVDN 500 service and bundled hardware, plus a $199 installation fee. That gives you an antenna about the size of a Ping-Pong paddle, an internal digital modem for your PC, and a TV set-top box. Once CellularVision installs it all, you can sign up for the usual TV channels and unlimited Internet access at 500 kbps downstream and at regular modem speeds upstream. Expect CVDN 500 service to be introduced to more major metropolitan areas in the next year or two.

RADIO-ACTIVITIES

ON ANOTHER FRONT, the U.S. government has been auctioning off surplus radio bandwidth that offers Net access speeds starting at 1.544 mbps. One of the first companies to take advantage is WinStar, a New York–based start-up that uses radio towers to transmit voice, data, and video through the phone systems of small and large businesses. The service is now available in nine cities, including Chicago, Los Angeles, and New York, and is planned for 30 cities by summer 1998. The service is also available from some ISPs in other cities.

WinStar charges between $225 and $400 per month; eventually it will be offered to rural consumers in apartment buildings and condominiums. Prices should drop once the service spreads to other areas and when more firms win radio licenses to provide the service, says Doug Morgan, WinStar's vice president.

So relief from the Web wait is definitely on the horizon. Price Waterhouse predicts that no single technology—wired or wireless—will predominate. But the variety of offerings and competitors suggests that you'll be able to find a good solution that suits both your location and your pocketbook.

—*Mike Hogan* ▶

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November 19, 1996
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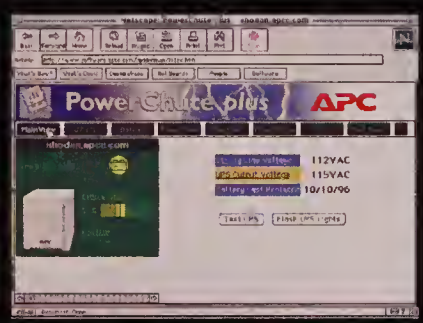

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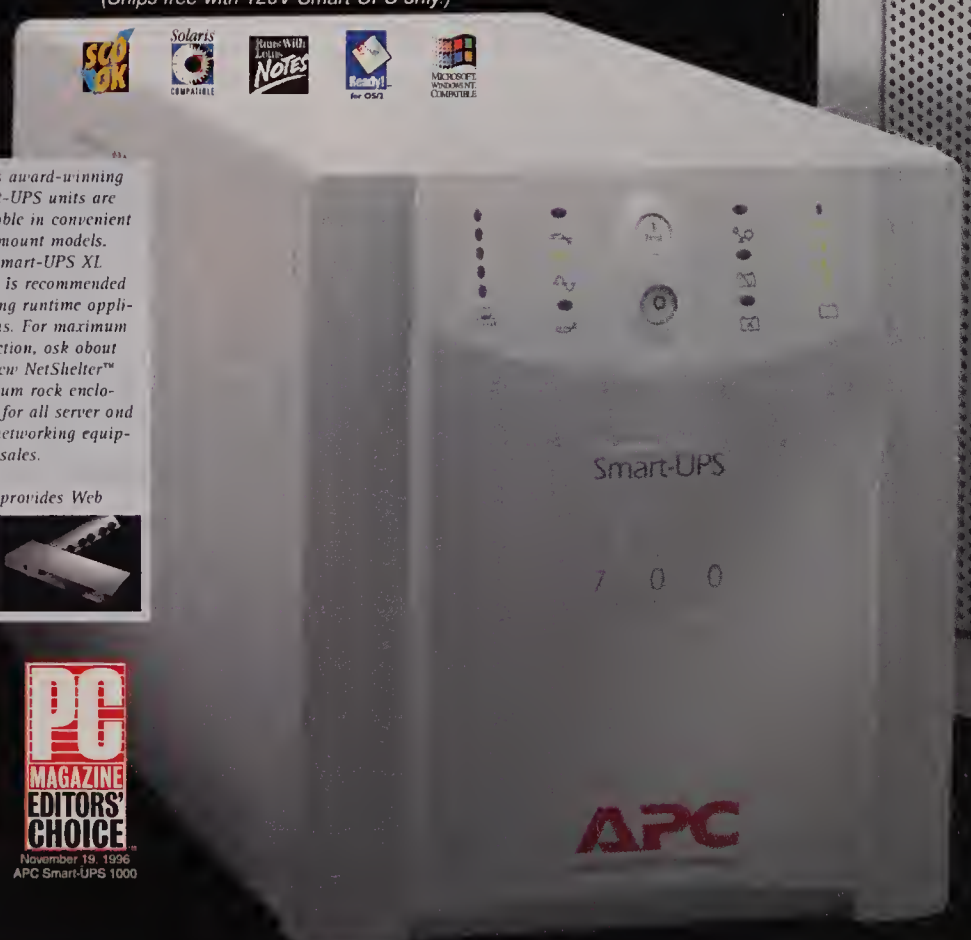

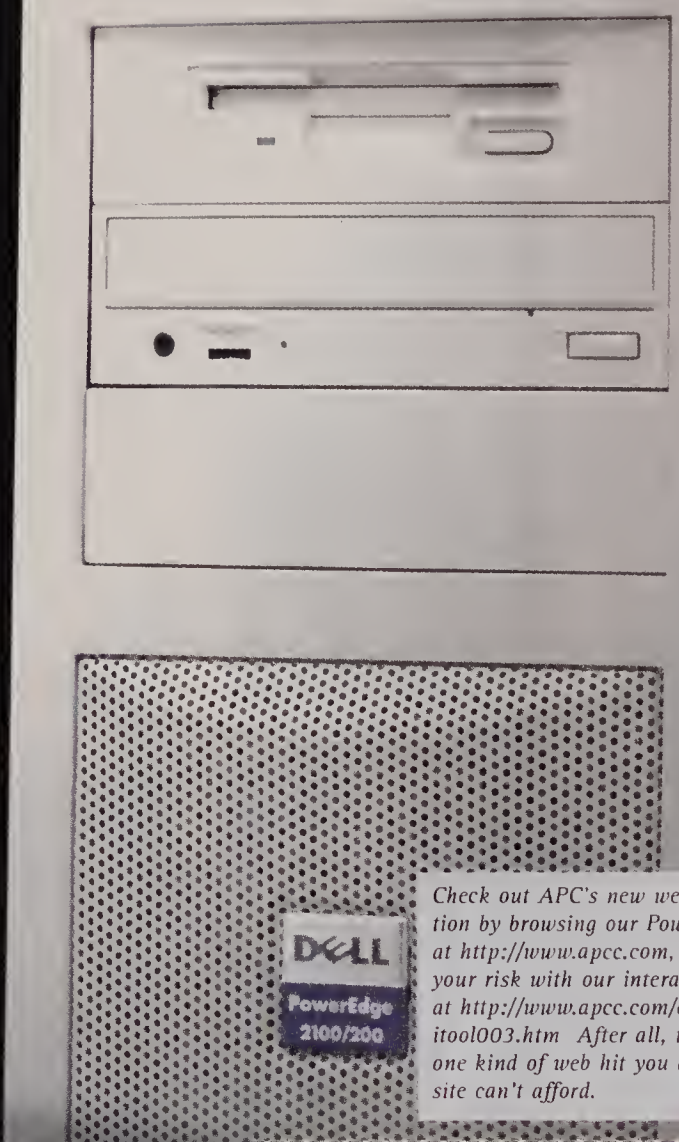

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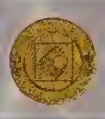


Circle 17 on reader service card

Coming PC Technologies: Technoparadise or Mere Puffery?

ANALYSIS

TECHNOLOGIES that promise computing nirvana always seem to lie just around the corner. PCs that are easy to set up, upgrade, and maintain have been in the works for years. Over the next two years you can expect to hear about new ports and peripherals that eliminate hardware and software conflicts. And look for built-in diagnostics that can back up a hard drive if it is about to fail, or alert you when someone removes RAM from your system. We have a bridge for sale, too.

It's easy to be skeptical about new technology. Last month we were disappointed by our first tests of Universal Serial Bus, a new technology that was supposed to make upgrading a breeze by offering Plug and Play and the ability to hot-swap devices. Plus, vendor claims that upcoming features will save thousands in support and maintenance are based on a highly controversial report from the Gartner Group earlier this year.

Regardless, many of these future technologies will continue to be hyped, and some will even make it to market. Here's a closer look at their claims, cons, and when—or if—you can expect them.

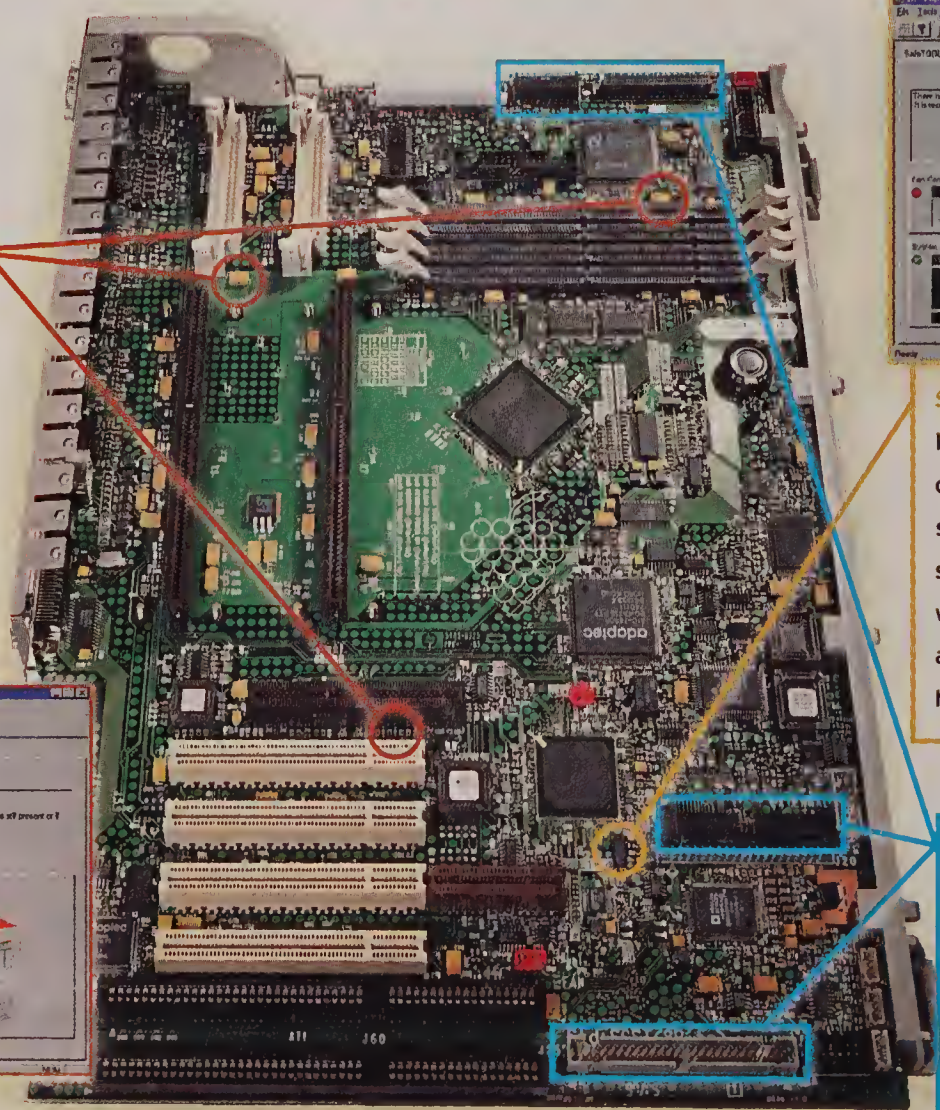
COMING TO PORT

EXPECT TO SEE a more-powerful cousin of USB—the much faster IEEE 1394, or FireWire, connection—on the back of high-end PCs within a year. Like USB, FireWire is supposed to decrease software configuration headaches and to offer Plug and Play and hot swapping. FireWire's maximum 400 megabit-per-second performance is ideal for data-intensive applications such as publishing and digital video. Currently, you can buy a FireWire PCI add-in card for your PC from Adaptec and connect Sony's $3000 Digital Camcorder for transferring digital video to your PC for editing, then copy it back to tape.

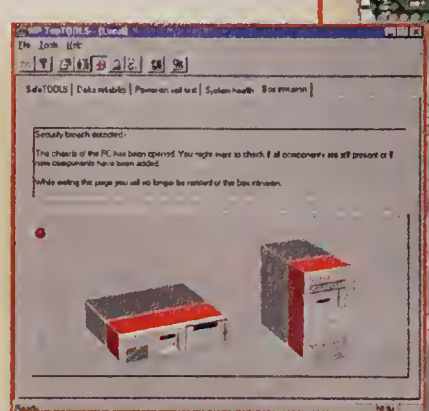
Beyond this year, details get a little sketchy. Although most major hardware makers say they'll support FireWire, industry politics and technical issues could slow the introduction of more peripherals. For example, while major hard drive makers say they're working on FireWire hard disks, booting from those disks will require new BIOSes. The upshot: Though Windows 98 will support the technology, peripherals for mainstream PCs, which also will include scanners, color printers, and DVD-ROM drives, may not appear until 1999. ▶

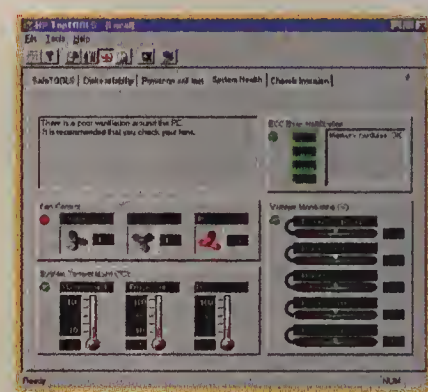
HEWLETT-PACKARD XU MOTHERBOARD

HP's XU WORKSTATION sports several new technologies. Here's a peek under the cover.



TEMPERATURE SENSORS Sensors track processor, motherboard, and hard drive temperatures and control cooling fan speeds or sound an alarm (even shut down the system) in the event of critical overheating.





SYSTEM STATUS The BIOS in HP's proprietary "Little Ben" chip monitors overall system status and using external sensors (not shown) detects when the PC case is opened and whether any components have been changed.

HARD DRIVE CONNECTORS S.M.A.R.T. hard and CD-ROM drives hook up to SCSI (narrow and ultra) and EIDE connectors, and are monitored and controlled through system software.

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3. People Screaming.
4. "You Must Believe Me!"
5. Exploding Buildings.
6. Whirring Space Ships.
7. Brains Being Sucked.
8. Bones Crunching.
9. Aliens Phoning Home.
10. Metallic Scraping.
11. Cars Crashing.
12. Kidneys Bursting.
13. Insertion of Probes.
14. Heads Exploding.
15. "Run for Cover!"
16. "Warning."
17. Aliens Melting.
18. Pods Hatching.
19. Destroying the Monster.
20. Buildings Imploding.
21. Spaceships Docking.
22. Boiling Flesh.
23. "Mayday, Mayday!"
24. Exploding Spaceship.
25. People Running.
26. "I saw a UFO!"
27. Planes Taking Off.
28. "We're at DefCon 1."
29. Aliens Communicating.
30. Children Crying.
31. Slurp.
32. Clink of Autopsy Instruments.
33. Laser Swords Crashing.
34. "Hyperspace!"
35. Flesh Being Torn Off Bones.
36. "They're Coming."
37. Wailing Sirens.
38. "You Must Die."
39. "Beam Me Up."
40. Zap!!!
41. Air Locks Closing.
42. "Oh, My God!"
43. Lasers Charging Up.
44. "We Need More Power!"
45. Ray Guns Blasting.
46. Calling the Mothership.
47. Horns Blaring.
48. "We Won!"
49. "Lock on Target!"
50. Crystals Charging.
51. Area 51 Guard: "No Admittance."
52. Zap-Zap!
53. Warning Alarms.
54. Air Locks Opening.
55. "Set to Stun!"
56. "Red Alert!"
57. Shields Up.
58. Warp Speed.
59. "Blast 'em!"
60. Eyeballs Squishing.
61. Spaceships Cloaking.
62. Radar Ping.
63. "Fire at Will!"
64. "Take Me to Your Leader."

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Circle 54 on reader service card

PC TECHNOLOGIES: COMING ATTRACTIONS

TECHNOLOGY	What it does	When it's due	Chances of success
Device Bay	Externally accessible bay that accepts interchangeable peripherals. Planned for both desktop and portable PCs.	Peripherals due late 1998 or early 1999. No software support in first version of Windows 98.	Poor
FireWire	IEEE 1394 High-Performance Serial Bus. Transfers data at up to 400 mbps. Claims to allow easy device interconnection on one cable.	Add-in cards available. Only peripherals are Sony digital camcorders. Scanners available mid-1998; other devices in late 1998 or early 1999.	Good
JetSend	Lets intelligent peripherals communicate with each other without sending through the PC.	No peripherals available yet; timetable unknown.	Too early to tell
Self-monitoring PCs and peripherals	Different technologies monitor voltages, temperatures, and peripherals. Take action or alert user if problems found.	In high-end workstations now; in most PCs by end of 1998.	Excellent

The new Device Bay spec from Compaq, Intel, and Microsoft illustrates the roadblocks to new hardware standards. This specification is designed to let you easily add peripherals like hard drives and CD-ROM drives to external bays in desktop and portable PCs. Device Bay was introduced with great fanfare earlier this year, however its chances look iffy. At press time, PC makers were reportedly balking at the idea of letting competitors' peripherals easily fit into their PCs.

Future systems might also include a JetSend port. This new technology from Hewlett-Packard lets specially designed peripherals communicate directly with one another without special drivers or complicated setups. For example, you might be able to connect a JetSend camera directly to a JetSend color printer, bypassing your PC. HP has released JetSend as an open standard and Microsoft has endorsed it, but so far the only other peripheral maker to endorse it is Canon, and the company hasn't announced a product or ship date. It's too early to say whether JetSend will make it or not.

PC AS COST CUTTER

COMPUTERS WILL SOON monitor themselves continuously and report potential problems before they result in system crashes. Self-monitoring diagnostics are appearing first in high-end systems, such as the new Hewlett-Packard XU series. Components such as temperature sensors can change fan speeds or even shut down the PC if it overheats. This feature becomes critical as vendors pack more and faster components into tinier spaces. CPUs and hard disks can generate a lot of heat, which can destroy electronic devices and data.

These self-monitoring capabilities may extend to PC security as well. HP and IBM are developing computers that detect when their cases are opened, and if any components are changed or removed, will notify you or your IS department. Expect to see self-monitoring technologies in standard desktop systems by the end of 1998.

Hard drives, too, are developing their own "smarts." Many high-end hard drives incorporate S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) software that can tell when a drive is having problems and then take action, such as backing up data to a tape drive. In fact, you may already have a S.M.A.R.T. drive in your PC and not know it. S.M.A.R.T. requires software that notifies you when it detects a problem. Currently, that's found mainly in network monitoring software such as Intel's LANDesk or HP TopTools. These capabilities should be widely available by the end of 1998.

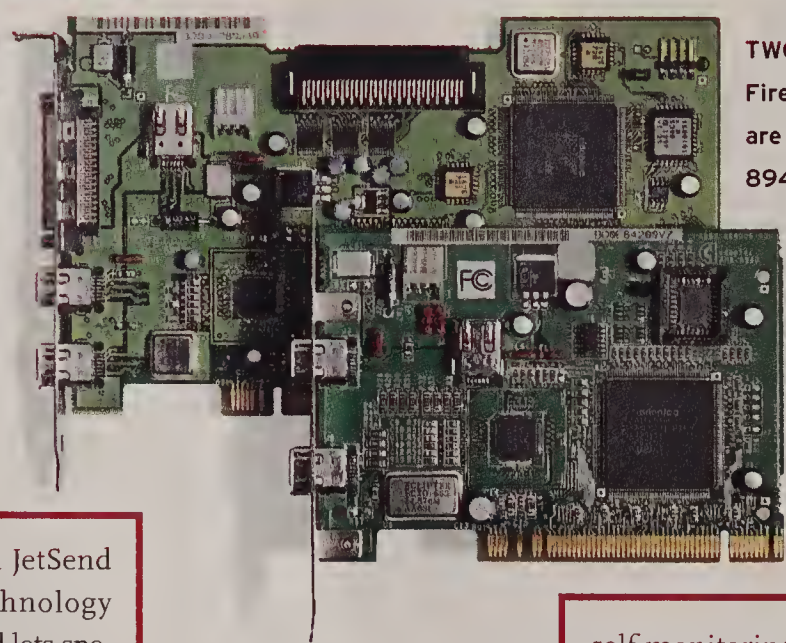
HOLD TIGHT

NO MATTER what the claims, a technology's odds of becoming part of your next system depend on whether Microsoft supports it under Windows. But just because Microsoft endorses it doesn't guarantee success. In recent years, the company has pushed a variety of now defunct hardware specifications. In 1996, Microsoft announced the Simply Interactive PC, which became PC-97. Now PC-98 is under development, a spec that includes Device Bay and self-monitoring features.

If you're in the market for a new PC or peripheral, the next year or so will be confusing as new technologies compete for your hard-earned dollars. But don't rush: Many, such as USB, still need to have the kinks worked out. But rest assured that PCs that are easier to set up and that are more reliable are on the way.

—*Stan Miastkowski* ▶

FIREWIRE CARDS



TWO OF THE first FireWire add-in cards are Adaptec's AHA-8945, which blends FireWire with an Ultra SCSI interface for fast hard disks, and the AHA-8940 (front), which adds FireWire only.

PHOTOGRAPH: JOHN GREENLEIGH

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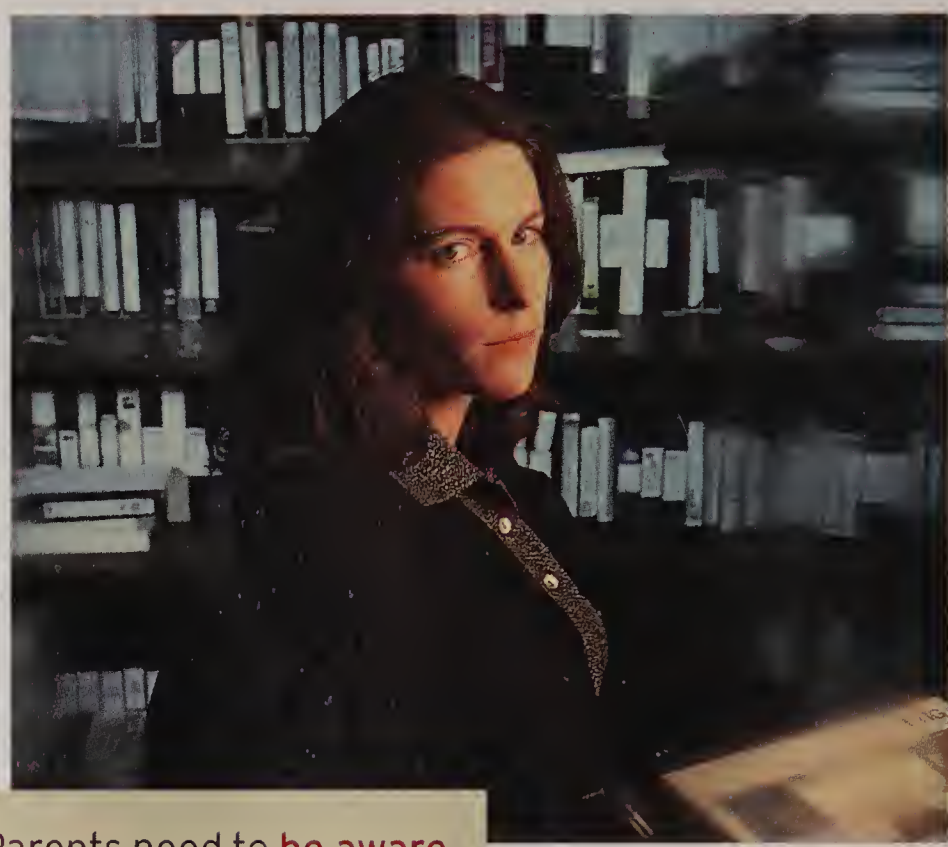
Circle 59 on reader service card

Internet Filters: The Smut Stops Here. Or Does It? Screening Five Top Web Filters

ANALYSIS

WHEN THE Supreme Court overturned the obscenity provisions of the Communications Decency Act this summer, free-speech advocates and conservative organizations finally found something they could agree on: It's up to parents to keep children away from inappropriate material on the Net.

A big responsibility? Of course. But that's why they pay parents the big bucks. For a while it looked as if a new generation of software monitors and filters—designed to screen out sexually explicit material without trampling on anyone's right to free speech—would make the job a lot easier. No such luck. Despite a world of good intentions, most of these products on the market today leave a lot to be desired.



"Parents need to be aware that the programs employ a value system."

THE CENTER for Media Education's Shelley Pasnik cautions parents not to let screening software make all the decisions for them.

A MOVING TARGET

INTERNET-BLOCKING software is neither as easy to use nor as foolproof as parents and developers would like. It sometimes lets through shockingly explicit material while screening out safe and useful content. And it can be awfully inflexible. To prevent tampering by computer-savvy kids, most of the programs do not provide users with access to their lists of blocked sites. As a result, parents must blindly accept the developer's philosophy about what is—and isn't—appropriate for children.

Among the five programs we tested, two (Cybersitter and SurfWatch 1.6) effectively filtered out all ten of our bellwether adult-oriented pages. Although easily identifiable sites such as *Playboy* magazine's home page were blocked by every product we tested, some explicit sites—with names like Hardcore Galaxy, New York Dolls, and Horney [*sic*] Women—made it through several of the filters.

At first glance, that may seem surprising. After all, the programs filter out objectionable material using a combination of keyword lists and an extensive database of sites reviewed by the software developer. Why don't they work better?

To begin with, the programs are shooting at moving targets. With new sites being added daily—and existing sites moving from one Internet service provider to another—it's a battle to keep Web address lists up to date, says Susan Getgood, director of marketing for Microsystems Software's CyberPatrol, the official filtering program for America Online. The more frequent the updates, the better the coverage; SurfWatch, CyberPatrol, and Cybersitter all update their lists daily. Programs that let parents customize their own list of objectionable sites provide yet another level of protection.

As for the keyword lists, the problem is more complex. Some of the filters search on the Web address, but not on the page itself. So if the telltale words don't appear in the address, the offensive material will slip through.

MY MORALS OR YOURS?

OF THE PROGRAMS we tested, SurfWatch is by far the simplest to install and use. The software is so unobtrusive that the only way you know it's working is by the icon on the Windows toolbar and the "Blocked by SurfWatch" notice that pops up when you try to access an objectionable site.

But its simplicity also means fewer options for parents. SurfWatch 1.6 doesn't let users create their own lists of objectionable sites (though this capability will be available in version 3.0). The program also doesn't allow different access privileges for different family members. The only way to override its restrictions is to turn the filter off entirely. And in its efforts to screen offensive content, SurfWatch also filtered out potentially valuable educational material that some parents may want their teens to see, such as the safe-sex advice offered by Planned Parenthood on its Web page, and an educational site for teens called SaferSex.

Of course, to some parents a safe-sex site may be the sort of thing they want to keep their kids away from. "Parents need to be aware that the [screening] programs employ a value system," says Shelley Pasnik, director of children's policy at the Center for Media Edu- ▶

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RATING THE FILTERS

PRODUCTS	Price	Supports rating system	User-customizable lists	Defines multiple users	Effectiveness	Reader service number
Microsystems Software's CyberPatrol 800/928-2600 www.cyberpatrol.com	$29.95 street; includes three months of updates	●	●	●	Blocked six of ten adult sites	755
Solid Oak Software's Cybersitter 800/388-2761 www.solidoak.com	$39.95street; free updates	●	●	○	Blocked all adult sites	756
Net Nanny Software's Net Nanny 3.1 604/662-8522 www.netnanny.com	$39.95 list, $26.95 direct; free updates	○	●	○	Blocked six of ten adult sites	757
Net Shepherd's Net Shepherd 2.0 403/218-8912 www.netshepherd.com	Free software; updates $12 per year	○	○	●	Blocked seven of ten adult sites	758
SurfWatch Software's SurfWatch 1.6 800/458-6600 www.surfwatch.com	$49.95 street; free updates for first year	○[1]	○[1]	○	Blocked all adult sites	759

● Yes ○ No

[1] Will be added in an upcoming release.

cation in Washington, D.C. Although most parents would clearly find some sites objectionable, there's also a tremendous gray area, Pasnik says—sites that may be acceptable to some parents, but not others. "We have to be careful," she adds, "not to let the technology make our decisions for us."

User customization may be one solution. CyberPatrol, for example, is one of the most customizable programs we tested. It lets you set multiple user levels (such as for kids of different ages), supports two industry rating standards, and has multiple control levels for a variety of areas—from violence and profanity to nudity and drug-related content.

Within each category a parent can select from among several access levels. It's possible, for example, to authorize access to sites containing partial nudity or those with artistic value, while screening out sites that depict sexual acts.

But more isn't always better. It takes time to experiment with CyberPatrol's tools before settling on a combination that provides the right access for every family member (the vendor says that usability is improved in the next version). And despite its arsenal, CyberPatrol allowed access to three of the ten adult sites in our tests. We could block access to all unrated sites, but we were locked out of the Museum of Modern Art's site, plus the Web pages for the *New York Times* and *National Geographic*, because they don't support the rating system.

We also saw two products that don't screen sites at all. Cyber Snoop and Internet WatchDog provide adults with tools to track their kid's Web travels and then to develop their own lists of sites. "We've never believed we should be blocking sites," explains Joe Field, vice president of Pearl Software, developer of Cyber Snoop. "We think adults need to be helping teach children right from wrong by discussing with them the types of sites they should and should not have access to."

Nevertheless, Field notes that some parents want more control. So the next version of Cyber Snoop (due in September) is slated to include keyword blocking. The company has also begun e-mailing a list of objectionable sites to customers who request it. But Field strongly recommends that parents develop their own lists of forbidden Web sites.

Recognizing the complexity of the issue, many national parenting and children's advocacy groups have issued guidelines for parents and teachers struggling to figure out the Web—and kids' access to it. One such guide is available for $8 from the National Parent-Teacher Association (www.pta.org/programs/guide.htm) and Children Now (www.childrennow.org). Each group encourages parents and teachers to experiment with filtering software, and they both emphasize the importance of keeping an open line of communication between parent or teacher and child.

SOME PRETTY RAUNCHY stuff can slip through the filtering process—including this page.

All the companies we contacted offer trial versions of their software, available for downloading from their Web pages. Should you buy one of the products? Not if you expect it to replace adult supervision. And not if you're too busy to put in some long hours tweaking it. But some sort of screening software, however imperfect, is probably better than an otherwise unchaperoned trip to cyberspace.

—*Roberta Furger*

• Cyber Snoop $29.95; Pearl Software; 800/732-7596; www.pearlsw.com

READER SERVICE NO. 785

• Internet WatchDog $29.95; Charles River Media; 800/382-8505; www.algorithm.com

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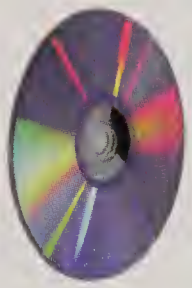

The new multimedia sheriff goes by the initials DVD, and is fixin' to create a whole new standard throughout the computer territories. One Digital Versatile Disc holds 4.7GB of data, a sprawling data prairie that's seven times the capacity of a CD, room enough for up to 133 minutes of video that makes your VCR tapes seem as fuzzy as the Badlands in a dust storm.

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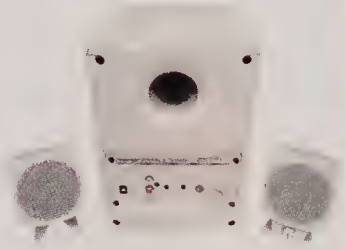

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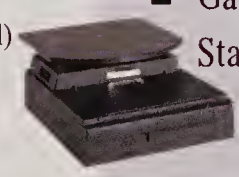
(Some items only available to new or existing Gateway customers or with the purchase of a system.)



- Gateway Solo Docking Station **$599**

- Gateway Solo Mini Docking Station **$199**

- Additional 2300/9100 Lithium-Ion Battery **$200** *(with system purchase)*

- Printers *(Call for information and pricing.)*

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® PROCESSOR

GATEWAY2000

"You've got a friend in the business."®

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www.gateway.com

Gateway Solo Portable PCs For The Road

Bigger Than All Outdoors

Hailing from South Dakota, wide open spaces have always attracted Gateway. So it's no wonder we invented a whole new computer category by introducing the Destination Big Screen PC/TV in April 1996.

Its huge 31-inch monitor, wireless keyboard and Field Mouse remote make the Destination Big Screen PC/TV a system born and bred for group use. And, with a click of the mouse button, the Destination system becomes a fully functional television. The Destination Big Screen PC/TV includes options like the power of a **Pentium® II** processor and the amazing digital video of DVD. Custom configure one to fit your needs and yank computing out of the den and into the:

Family room — Computing and exploring the Internet just became group activities. After a year on the market, 61% of Destination system owners we surveyed said they spent more time with their families as a result of the Destination Big Screen PC/TV.

Conference room — Now you can combine the presentation power of a big screen computer with the functions of a video system. Add your video cassette player, cable TV hookup and phone line and you've got one system that does it all, at a price that will let you outfit all your conference rooms.

Classroom — How do you teach computer-based lessons to a class? The screen size of a traditional desktop made it tedious at best. Now educators can wheel the Destination Big Screen PC/TV to the head of the class and give all students a great view. And Gateway value delivers a lot without consuming the ever-shrinking budget.

Gateway Destination D5-166 Big Screen PC/TV with Boston Acoustics MicroMedia Speakers

GATEWAY™ Destination™ Big Screen PC/TVs

D5-166

- Intel® 166MHz Pentium® Processor with MMX™ Technology
- 32MB SDRAM
- 512K Pipelined Burst Cache
- Destination 31" VGA Monitor
- 2MB Graphics Accelerator w/ Cable-Ready TV Tuner
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq® Wavetable Audio
- ▸ **Boston Acoustics® MicroMedia™ Speakers**
- TelePath® Modem *for Windows* with x2™ Technology**
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad® Pointing Device
- Wireless Field Mouse® Remote
- Microsoft® Windows® 95
- Home Software Titles
- Gateway Gold™ Service & Support◆ for Big Screen PC/TVs

D5-166 $2499 As low as× $87/mo.

D5-200 $2999 As low as× $104/mo.

(200MHz Pentium Processor with MMX Technology, 4GB Hard Drive, DVD-ROM Drive and DVD Decoder)

D6-233

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 64MB EDO DRAM
- Destination 31" VGA Monitor
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- 4GB 11ms Ultra ATA Hard Drive
- ▸ **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- ▸ **harman/kardon® High-Fidelity Sound System**
- TelePath Modem *for Windows* with x2 Technology**
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad Pointing Device
- Wireless Field Mouse Remote
- MS® Windows 95
- Home Software Titles
- Gateway Gold Service & Support◆ for Big Screen PC/TVs

$3999 As low as× $139/mo.

◆*The Destination 31-inch monitor is covered by a one-year limited warranty. Call or write for a free copy.*

D6-300XL

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB EDO DRAM
- Destination 31" VGA Monitor
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- PowerVR 3-D Graphics Accelerator
- 8GB 8.5ms Ultra ATA Hard Drive
- ▸ **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- ▸ **harman/kardon High-Fidelity Sound System**
- TelePath Modem *for Windows* with x2 Technology**
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad Pointing Device
- Wireless Field Mouse Remote
- MS Windows 95
- Home Software Titles
- Gateway Gold Service & Support◆ for Big Screen PC/TVs

$4599 As low as× $160/mo.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)

- Logitech™ WingMan® Extreme™ Joystick **$39**
- Additional Destination 31-inch VGA Color Monitor **$999**
- EasyPhoto Drive™ Photo Scanner **$129** *(with system purchase)*

- Epson® PhotoPC™ 500 Digital Camera **$499**
- Epson Stylus® COLOR 600 Ink Jet Printer **$299**

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® II PROCESSOR

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Destination Big Screen PC/TVs For Group Computing

Big Systems For Small Operations

The GATEWAY™ GP-Series professional PCs aim to deliver one system that can do many things for small- and medium-sized business. Head-of-the-pack technology lets our GP-Series PCs take care of everything from inventory to accounting. We deliver MMX™ technology across the line and options that include the **Pentium® II** processor, huge backup storage devices and software that can boost business productivity. The GP-Series systems tackle your business needs like a steer wrestler in the championship go-round.

You Call The Shots — Because you know more about your business needs than anyone, you decide what goes into your GP-Series system. Our sales representatives can help you assess your needs and explain your options. But you make the final call.

Fresh Technology — Intel Pentium processors with MMX technology can take care of your business needs, thanks to our philosophy of combining them in fresh configurations. Things like 512K cache, plenty of RAM and Ultra ATA hard drives up to 6.4GB make Pentium processors perfect for your small office/home office needs.

Software That's Part Of The Deal — Gateway knows hardware is just part of the bargain. You also need software, and we've got it in standard and optional packages. So while some companies charge you extra for the basics like anti-virus software and productivity programs, Gateway throws them in with the system, no extra charge.

Gateway GP-Series Professional systems offered in your choice of tower or desktop model.

Gateway GP-Series PCs for the Office Professional

GP5-166

- Intel® 166MHz Pentium® Processor with MMX™ Technology
- 32MB DRAM
- 512K Pipelined Burst Cache
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/16X max CD-ROM & 3.5" Diskette Drives
- GP-Series Desktop Case
- 104+ Keyboard & MS® IntelliMouse™
- Microsoft® Windows® 95 & MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold™ Service & Support for GP-Series PCs

$1449 Business Lease† $54/mo.

GP5-200

- Intel 200MHz Pentium Processor with MMX Technology
- 32MB DRAM
- 512K Pipelined Burst Cache
- CrystalScan®700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Desktop Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for GP-Series PCs

$1749 Business Lease† $64/mo.

GP6-233

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 64MB DRAM
- CrystalScan700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D 64-Bit Graphics
- 4GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for GP-Series PCs

$2399 Business Lease† $88/mo.

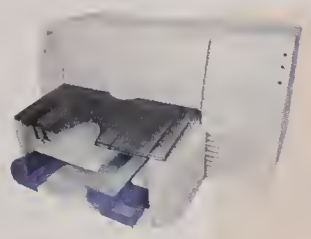
GP6-266 BEST BUY

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 64MB DRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for GP-Series PCs

$2899 Business Lease† $107/mo.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)



- Hewlett®-Packard DeskJet 820Cse Color Printer **$299**
- TR4 IDE 4GB Tape Backup Unit with Tape **$199** *(with system purchase)*
- TelePath® Modem *for Windows* with x2™ Technology** **$79**
- Iomega® Internal ZIP™ Drive with Two Discs **$99** *(with system purchase)*

Please call for current pricing on RAM and other upgrades.

MMX™ intel inside pentium® II PROCESSOR

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GP-Series PCs For The Office Professional

High-Tech Multimedia, Down-Home Values

No sense in making things complicated. Give customers fresh technology at amazing prices. That's the long and the short of GATEWAY™ G-Series multimedia PCs. These systems deliver the latest multimedia wonders, including MMX technology priced for everyone and the unbeatable value of the amazing **Pentium® II** processor.

Freshness That Puts The Competition On Edge

By refusing to build even one system before someone orders it and keeping our component inventory among the freshest in the industry, we've spooked our competitors for years.

Gateway constantly searches for the greatest deals on the latest technology, like the **300MHz Pentium II** processor. Then we pack our systems with value and have technical support standing by to help 24 hours a day.

Pentium II Processor Power, MMX Technology, DVD Magic

When the **Pentium II** processor was coming out, we took a look-see and discovered this processor was a great deal for *everyone*. So we worked with Intel to secure a processor pipeline so we could deliver for our customers. We moseyed around the globe and found a way to lasso DVD-ROM drives. Same deal on the breakthrough EV900 monitor and the pristine sound of Boston Acoustics speakers.

Large Needs? Small Budget? We've Got You Covered

Looking for something to ease yourself into the computing world or to use as a second system? No problem. Check out the G5-166 multimedia PC complete with printer for $1,499. No matter what your needs or budget, we've got a system that fits.

We're always out there, looking for the great deals and the next technology that will benefit our customers. It's all part of leading the multimedia computing stampede.

Gateway G6-233 Multimedia PC with Boston Acoustics Speakers

Gateway G-Series Multimedia PCs for the Home

G5-166

- Intel® 166MHz Pentium® Processor with MMX™ Technology
- 16MB DRAM
- 512K Pipelined Burst Cache
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 1.6GB 12ms Ultra ATA Hard Drive
- 12X min/16X max CD-ROM & 3.5" Diskette Drives
- Ensoniq® Wavetable Audio
- Altec™ Lansing ACS-41 Speakers
- TelePath® Modem *for Windows* with x2™ Technology**
- G-Series Desktop Case
- 104+ Keyboard & Microsoft® Mouse
- MS® Windows® 95 & Home Software Bundle
- ▸ **Color Bubble Jet Printer**
- Gateway Gold™ Service & Support for G-Series PCs

$1499 As low as✗ $52/mo.

G5-200

- Intel 200MHz Pentium Processor with MMX Technology
- 32MB DRAM
- 512K Pipelined Burst Cache
- CrystalScan®700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 2MB 3-D 64-Bit PCI Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq Wavetable Audio
- Altec Lansing ACS-41 Speakers
- TelePath Modem *for Windows* with x2 Technology**
- G-Series Desktop Case
- 104+ Keyboard & MS IntelliMouse™
- MS Windows 95
- Home Software Titles
- MMX Technology-Enhanced Software
- Gateway Gold Service & Support for G-Series PCs

$1799 As low as✗ $63/mo.

G6-233

- Intel 233MHz **Pentium® II** Processor with 512K Cache
- 32MB DRAM
- CrystalScan700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 4MB 3-D 64-Bit Graphics
- 4GB 11ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq Wavetable Audio
- ▸ **Boston Acoustics® MicroMedia™ 3-Piece Speaker System**
- TelePath Modem *for Windows*, with x2 Technology**
- G-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- Home Software Titles
- MMX Technology-Enhanced Software
- Gateway Gold Service & Support for G-Series PCs

$2399 As low as✗ $84/mo.

G6-266 BEST BUY

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 64MB DRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq Wavetable Audio
- ▸ **Boston Acoustics MicroMedia 3-Piece Speaker System**
- TelePath Modem *for Windows*, with x2 Technology**
- G-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- Home Software Titles
- MMX Technology-Enhanced Software
- Gateway Gold Service & Support for G-Series PCs

$2999 As low as✗ $104/mo.

G6-300XL

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB DRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- TV/FM Tuner Card
- 8GB 8.5ms Ultra ATA Hard Drive
- ▸ **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- ▸ **Boston Acoustics MicroMedia 3-Piece Speaker System**
- TelePath Modem *for Windows* with x2 Technology**
- G-Series Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- Home Software Titles
- MMX Technology-Enhanced Software
- Gateway Gold Service & Support for G-Series PCs

$3799 As low as✗ $132/mo.

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a system.)

- Epson® Stylus® COLOR 400 Ink Jet Printer **$199**
- MS SideWinder™ 3D Pro Joystick **$59**
- Education Software Bundle Grades K-3 or Grades 4-8 **$99** (each)

Please call for current pricing on RAM and other upgrades.

✗On-site service is available to most locations in the continental United States, Alaska, Hawaii, Puerto Rico and Canada after you and your Gateway technician determine an on-site visit is necessary. On-site service is provided by PC Technology Services, Inc. On-site is not available for any monitor, mouse, keyboard, E-1000 PC or portable system. Write or call for a free copy of the on-site service agreement.

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LOW MONTHLY PAYMENTS
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G-Series Multimedia PCs For The Home

Barn Burnin' Values

Get more for your money with GATEWAY™ PCs!

Gateway G-Series Multimedia *PC*

G6-266 BEST BUY

- Intel® 266MHz **Pentium® II** Processor with 512K Cache
- 64MB DRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- Ensoniq® Wavetable Audio
- ▸ **Boston Acoustics® MicroMedia™ 3-Piece Speaker System**
- TelePath® Modem *for Windows*, with x2™ Technology**
- G-Series Mid-Tower Case
- 104+ Keyboard & Microsoft® IntelliMouse™
- MS® Windows® 95
- Home Software Titles
- MMX™ Technology-Enhanced Software
- Gateway Gold™ Service & Support for G-Series PCs

$2999 As low as✗ $104/mo.

Gateway GP-Series Professional *PC*

GP6-266 BEST BUY

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 64MB DRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 4MB 3-D 64-Bit Graphics
- 6.4GB 10ms Ultra ATA Hard Drive
- 12X min/24X max CD-ROM & 3.5" Diskette Drives
- GP-Series Mid-Tower Case
- 104+ Keyboard & MS IntelliMouse
- MS Windows 95
- MS Office 97, Small Business Edition plus Encarta® 97
- Gateway Gold Service & Support for GP-Series PCs

$2899 Business Lease† $107/mo.

Please call for other configurations. We custom build each GATEWAY 2000® system to your specifications.

Gateway Destination™ Big Screen *PC/TV*

D5-200 BEST BUY

- Intel 200MHz Pentium® Processor with MMX Technology
- 32MB SDRAM
- 512K Pipelined Burst Cache
- Destination 31" VGA Monitor
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- 4GB 11ms Ultra ATA Hard Drive
- ▸ **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- ▸ **Boston Acoustics MicroMedia 3-Piece Speaker System**
- TelePath Modem *for Windows* with x2 Technology**
- 7-Bay Charcoal-Colored PC Case
- Wireless Keyboard w/ Integrated EZ Pad® Pointing Device
- Wireless Field Mouse® Remote
- MS Windows 95
- Home Software Titles
- Gateway Gold Service & Support◆ for Big Screen PC/TVs

$2999 As low as✗ $104/mo.

Gateway Solo™ Portable *PC*

9100XL BEST BUY

- ▸ **13.3" XGA TFT Color Display**
- Intel 233MHz Pentium Processor with MMX Technology
- 64MB SDRAM (expandable to 192MB)
- 256K Pipelined Burst Cache
- ▸ **4MB EDO Video RAM (1280 x 1024 external)**
- ▸ **Removable Combo 6X min/11X max CD-ROM & 3.5" Diskette Drive**
- USB Ports & Zoomed Video
- NTSC/PAL Video Input & Output
- 5GB Hard Drive
- Premium 16-Bit Wavetable Sound & Stereo Speakers
- PCMCIA Modem with x2 Technology**
- Two 12-Cell Lithium Ion Batteries & AC Pack
- 88-Key MS Windows 95 Keyboard
- EZ Pad Pointing Device
- Executive Carrying Case
- Gateway Solo Mini Docking Station
- MS Windows 95
- MS Office 97, Small Business Edition plus Encarta 97
- Gateway Gold Service & Support for Portable PCs

$5899 As low as✗ $205/mo.

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Our quality relationship

"We bought a Seanix Baby Grand to use at home and liked the price so much we sent one to college with our grandson."

Industry's Leading Warranty

5-year limited parts & labor warranty on motherboard, CPU, memory & video card

3-year limited parts & labor warranty on monitor & all other components

The price got their attention, but what impressed the McCloud's was the Seanix desire to build a quality relationship for a lifetime of computing.

What's behind a quality Seanix relationship?

Reliability... At Seanix we custom build systems under the highest quality contr standards. All of our PCs are 100% tested through every stage of the manufacturi process. These extreme measures have earned our factories the world class distincti of being ISO 9001 and 9002 certified. In other words, our systems are built to la

Adaptability... We design, engineer and manufacture our own superior quality motherboards and video cards. This gives us the edge when it comes to incorporati and adapting new technology into our systems. Like our new Pentium® II process based system with perfomance and productivity enhancing features including AG SDRAM, UltraDMA and OnNow support.

5-Year Warranty... We are so convinced our quality will meet your expectations that we back every system with a 5-year limited warranty, which is the best in the industry.

Value... When you add up all the state-of-the-art technology, performance and adaptability Seanix has to offer, then consider the unbeatable pricing, Seanix systems are an incredible value.

So, if you're interested in a quality relationship with a computer company that is setting new standards of excellence, call Seanix today. Our systems will exceed your expectations, at an unbeatable price.

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GSA Number GS-35F-4766G

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including monitor **only $999**

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Intel 166MHz Pentium® Processor with MMX™ Technology
512KB Internal Cache
16MB EDO Memory
WD 1.6GB Hard Drive
2MB EDO, 64-Bit PCI Video
14" Seanix Monitor, .28mm (12.9" v.i.s.)
16X/12X CD ROM Drive
33.6K Fax/Modem, Speaker Phone, Voice Mail or 3COM® Ethernet Card
16-Bit Sound Card
Altec™ Lansing Speakers
$999 PER MO. $35.00

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Intel 166MHz Pentium Processor with MMX Technology
512KB Internal Cache
16MB EDO Memory
WD 1.6GB Hard Drive
2MB EDO, 64-Bit PCI Video
15" Seanix Monitor, .28mm (13.8" v.i.s.)
10/100 Ethernet Card
Intel LANDesk® Client Manager 3.0
DMI 2.0 Compliant
$999 PER MO. $35.00

MMX™ intel inside pentium® II PROCESSOR

CONSUMER SERIES*

CS Price 166
Intel 166MHz Pentium Processor with MMX Technology
512KB Internal Cache
32MB EDO Memory
WD 3.0GB Hard Drive
S-3 Virge, 2MB EDO 3D, 64-Bit PCI Video
15" Seanix Monitor, .28mm (13.8" v.i.s.)
16X/12X CD ROM Drive
33.6K Fax/Modem, Speaker Phone, Voice Mail
16-Bit Sound & Micraphone
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Microsoft Home Essentials®
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CS Price 200 **$1499** PER MO. $53.00
CS Price 233 **$1649** PER MO. $58.00

CS Value 166
Intel 166MHz Pentium Processor with MMX Technology
512KB Internal Coche
64MB SDRAM
WD 4.0GB Hard Drive
Matrax Mystique 4MB SGRAM, 3D
17" Seanix Monitor, .28mm (15.8" v.i.s.)
24X/12X CD ROM Drive
56K Fax/Modem, Speaker Phane, Vaice Mail
Ensoniq® AudioPCI™ Wavetable & Microphone
Altec Lansing Speakers
Micrasoft Hame Essentials
$1849 PER MO. $65.00

CS Value 200 **$1999** PER MO. $70.00
CS Value 233 **$2149** PER MO. $76.00

CS Pawer2 233
Intel 233MHz Pentium II Processor
512KB Internal Cache
64MB SDRAM
WD 6.0GB Ultra DMA Hard Drive
Matrax Millenium II 4MB WRAM
17" Seanix Manitor, .28mm (15.8" v.i.s.)
24X/12X CD ROM Drive
56K Fax/Modem, Speoker Phone, Voice Moil
Ensoniq AudioPCI Wavetable & Microphone
Altec Lansing ACS 400 + 250 Subwoofer
Microsoft Home Essentials
$2799 PER MO. $98.00

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Intel 233MHz Pentium® II Processor
512KB Internal Cache
32MB EDO Memory
WD 3.0GB Hard Drive
S-3 Virge, 2MB EDO 3D, 64-Bit PCI Videa
15" Seanix Monitor, .28mm (13.8" v.i.s.)
16X/12X CD ROM Drive
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16-Bit Sound & Microphone
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$1949 PER MO. $69.00

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Intel 233MHz Pentium II Pracessor
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64MB EDO Memory
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Matrax Mystique 4MB SGRAM, 3D
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Altec Lansing Speakers
Microsoft Home Essentials
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CS Value2 300 **$2899** PER MO. $102.00

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512KB Internal Cache
64MB SDRAM Memory
WD 6.0GB Ultra DMA Hard Drive
Matrax Millenium II 4MB WRAM
17" Seanix Monitor, .28mm (15.8" v.i.s.)
Toshiba DVD ROM
56K Fax/Modem, Speaker Phone, Voice Moil
Ensoniq AudioPCI Wavetable & Microphone
Altec Lansing ACS 400 + 250 Subwoofer
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32MB EDO Memory
WD 3.0GB Hard Drive
S-3 Virge, 2MB EDO 3D, 64-Bit PCI Video
17" Seanix Manitor, .28mm (15.8" v.i.s.)
16X/12X CD ROM Drive
3COM Ethernet Card
Lotus SmartSuite or Corel WordPerfect 7 Suite
Intel LANDesk Client Manager 3.0
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Circle 226 on reader service card

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NEW PRODUCTS

DirectWave's Cyrix-Based PC: PII-Class Power for $2299

PRICE/PERFORMANCE WINNER: The Cyrix-based DirectWave MVP V C2-233 posted impressive PC WorldBench numbers for its CPU class and doesn't skimp on built-in features.

DESKTOP

IF YOU'RE IN the market for a fast and feature-packed PC at a great price, the choices keep expanding. DirectWave's **MVP V C2-233**—the first shipping PC we've tested that's based on Cyrix's 6x86MX-PR233 processor—offers excellent price/performance and is loaded with state-of-the-art hardware.

DirectWave's MVP V line also includes systems based on several competing CPUs: the 233-MHz Intel Pentium MMX and Pentium II, and the 233-MHz AMD K6. The Cyrix-based C2-233 (which actually runs at 188 MHz) scored an impressive 255 on the PC WorldBench test suite, edging out the 249 average of two AMD K6-PR233 PCs, and the 247 average of three Pentium II-233 systems we've tested. Surprisingly, the C2-233's score was very near the 261 average of six Pentium II-266s we've also tested. The DirectWave shone on individual application tests as well.

The numbers are so close to the Pentium II and K6 results that you wouldn't notice the difference in real-world use, but they certify the Cyrix chip as a serious contender in the Great CPU Sweepstakes, and demonstrate that DirectWave has put together a system that showcases its potential—at the eyebrow-raising price of $2299. At this writing, this is at least a couple of hundred dollars cheaper than any of the comparable Pentium II computers we've seen. You can find cheaper Pentium II–class systems powered by K6-PR233 CPUs, but they're not quite as fast and their hardware isn't as impressive.

Inside this system is 32MB of SDRAM, 512K of pipeline-burst secondary cache, a 6.5MB hard drive, and a 4MB Matrox Millennium graphics card. The unit we tested came with a 33.6-kilobits-per-second fax-modem with voice and speakerphone capabilities; by the time you read this, DirectWave expects to be shipping the system with a 56-kbps modem based on the K56flex specification. Similarly, the Toshiba 16X CD-ROM drive in our test unit is to be replaced by a Toshiba 24X model, and the Sound Blaster 32 PnP audio card will be replaced by the Sound Blaster 64.

The C2-233 comes with an easy-on-the-eyes 17-inch MAG InnoVision EJ700 monitor; its unique single rotary dial makes tweaking monitor settings a snap. On the audio front, the C2-233 includes a Wave 360 surround sound system, one of the finest-sounding two-piece speaker setups we've heard. However, the basic package lacks a subwoofer, an audiophile accessory found in many systems these days. (DirectWave offers an Arkins Acoustics subwoofer as a $50 option.)

As for software, the C2-233 comes with Windows 95 and Corel WordPerfect Suite 8 installed, along with Shark

MVP V C2-233

PRO: Loaded, no-compromise system at a budget price.

CON: Poor manuals.

VALUE: Excellent price/performance value.

DirectWave
800/882-8108
www.directwave.com
List price: $2299

READER SERVICE NO. 760

Leopard speakerphone software and a variety of audio and communications utilities. A printed Windows 95 manual is supplied, but we didn't get a modem manual, and the overall quality of the other documentation is poor. That's not unusual in today's PC market, but it can cause problems for inexperienced users.

If you're looking for an impressive system and are on a limited budget, the DirectWave will fill the bill nicely—at least until the next generation of PCs comes along.

—*Stan Miastkowski*

HiNote Ultra 2000: Big Screen in Slim Package

NOTEBOOK

FORGET DESKTOP replacement: Many desktop systems fall short of the **Digital HiNote Ultra 2000** when it comes to display. Not only is the 14.1-inch screen on Digital's latest portable the largest we've seen on a notebook to date, but it also provides more actual viewing area than most 15-inch desktop monitors. This lovely, spacious panel dominates the HiNote like a blue sky over a prairie vista, and spreadsheet wranglers will love the ability to see so many columns and rows without scrolling.

DESKTOP-SIZE DISPLAY: Digital's HiNote Ultra 2000 has a 14.1-inch screen—and a $5999 price.

Moreover, we could easily spend long periods of time looking at it. The 1024 by 768 resolution, which often produces eyestrain on a 15-inch desktop monitor, is very easy to look at on this flicker-free display. The only distraction on the preproduction unit I used was slightly uneven lighting: A small section at the bottom right of the active-matrix screen looked a little washed-out.

This Pentium MMX-166–based portable is high-end corporate all the way, suitable for both office use and the road. It comes with a removable 20X CD-ROM drive, a 2GB hard drive, 32MB of RAM, and 512K of secondary cache. Although we didn't test it formally, it seemed very snappy, launching applications such as Word and Excel in only a couple of seconds.

The Ultra 2000 also has better connectivity than most of its portable peers, packing a 33.6-kbps modem (upgradable to 56 kbps), an ethernet connection, and a fast 4-megabits-per-second infrared port. Both the network and the modem ports are built-in, leaving the two PC Card slots free for other devices. Preloaded software includes the TranXit file transfer utility, Internet Explorer, the WebEx offline browser, AudioRack 32, and ClientWorks, a utility that lets network administrators configure the notebook remotely. The price, however, does not include any apps. You'll have to pay extra for bundles such as Microsoft Office 97.

Expansion options include a port replicator ($379) and a multimedia docking station ($899), both of which add a Universal Serial Bus port. The lower-cost port replicator has a bay you can use to charge a second battery pack. However, the replicator tilts the notebook keyboard forward, so you should make sure the angle is comfortable before you buy it—or use an external keyboard.

The Ultra 2000 has one main drawback—a budget-stressing $5999 price. For that money, you could buy a good desktop PC *and* a notebook. Measuring a foot wide and 10 inches deep, the Ultra 2000 will also take up more of your desk than most notebooks and would be extremely awkward to use in the coach section of an airplane. Otherwise, however, it should travel very well. The Ultra 2000 weighs a little under six and a half pounds and measures only 1.4 inches thick—much lighter and thinner than any of the notebooks we've seen with 13.3-inch screens—and its AC adapter is very small, not much bigger than a pack of cards. Total traveling weight is a comfortable 7.2 pounds. Despite its Twiggy-like breadth, the Ultra 2000 feels very solid and sturdy, with little flex in the screen panel. It should be a strong contender for our Top 20 Notebook PCs chart in the months to come.

—*Bryan Hastings* ▶

Digital HiNote Ultra 2000

PRO: Largest notebook screen available, network-ready, sturdy, very thin.

CON: Very expensive.

VALUE: Great corporate notebook.

Digital Equipment Corp.
800/722-9332
www.windows.digital.com
Street price: $5999

READER SERVICE NO. 761

EDITED BY
Yardena Arar and Laurianne McLaughlin

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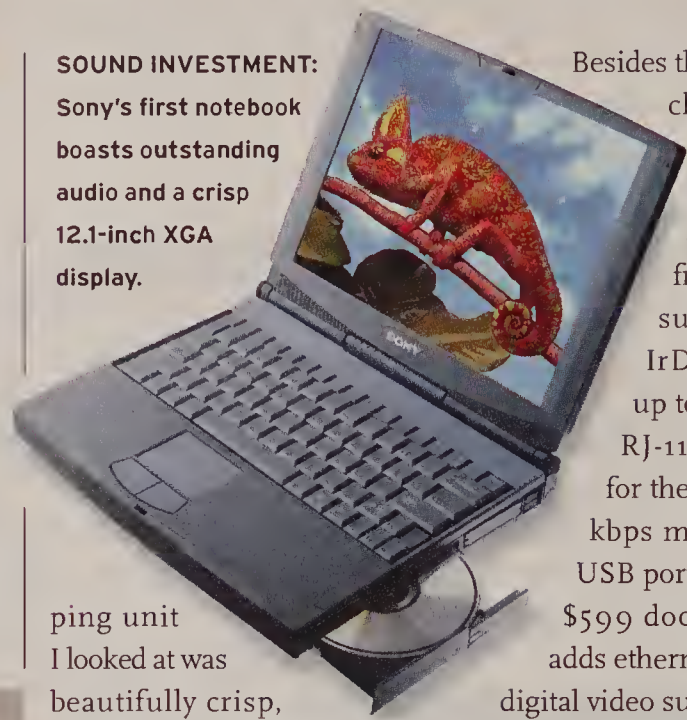
Sony's Chic New Multimedia Notebook

NOTEBOOK

COLOR-COORDINATED with its desktop siblings, Sony's first VAIO notebook isn't just another pretty face. Based on Intel's Pentium MMX-166 processor, the gray and violet-trimmed **PCG-707C** makes a formidable debut in the mobile multimedia arena.

The 12.1-inch active-matrix LCD screen on this $4499 notebook isn't the largest available, but the 1024 by 768 high-color display on the shipping unit I looked at was beautifully crisp, and text was surprisingly legible for its tiny size. Sound from the built-in stereo speakers was as good as I've heard on a notebook, and remote control headphones let you enjoy—and control—audio CDs on the removable 14.5X CD-ROM drive, even when the notebook is closed.



SOUND INVESTMENT: Sony's first notebook boasts outstanding audio and a crisp 12.1-inch XGA display.

Connectivity will never be a problem with this notebook. Besides the traditional, clearly labeled set of built-in ports, you also get an infrared port that supports fast IrDA (at speeds up to 4 mbps), an RJ-11 phone jack for the built-in 33.6-kbps modem, and a USB port. An optional $599 docking station adds ethernet, SCSI, and digital video support.

The PCG-707C ships with 32MB of RAM, a 2.1GB hard drive, and a huge software bundle (although business users might have preferred Microsoft Office 97 to Works 4.0). Although it's only 1.5 inches thick and not too heavy (about 7.5 pounds with CD-ROM and floppy drives and AC adapter), the notebook feels sturdy. It's not cheap, and the verdict is still out on performance, but for presentations and other multimedia uses the PCG-707C is clearly poised to do battle with the competition.

—*Yardena Arar*

VAIO PCG-707C

PRO: Outstanding sound, beautiful 1024 by 768 display.

CON: Notebooks with bigger displays available for the same price.

VALUE: Excellent for presentations and other multimedia tasks.

Sony Electronics

800/476-6972

www.sony.com/pc

Street price: $4499

READER SERVICE NO. 764

QUICK TAKES

Plug-In PC Sound

WANT TO add sound capability to your PC without messing with its innards? Street Technologies' $79.95, cigarette pack-size, 8-bit StreetSound audio adapter plugs into the parallel port of a PC or notebook. There's a printer pass-through socket so you can have your Duke Nukem explosions and hard copies too—but only one or the other at a time. The StreetSound comes with an AC adapter, a set of headphones, and its own drivers. It doesn't support audio CD-quality stereo output, but for most Internet sound and .wav files, it's a quick and convenient way to get PC sound without fury. Street Technologies; 914/682-4300; www.streetinc.com.

READER SERVICE NO. 763

—*Michael S. Lasky*

Seanix's Baby Grand: Solid $999 System

NOTEBOOK

MOST PCS priced at $1000—widely held to be the sweet spot for buyers—have tended to be technologically challenged. Seanix's $999 **Baby Grand** is the first we've seen with a true-blue Intel Pentium MMX-166 inside, along with a useful selection of hardware.

Seanix is delivering its Baby in two configurations, both of which include a 1.6GB hard drive. The consumer-oriented Baby Grand CS features 16MB of EDO RAM, an 8X CD-ROM drive, a sound card, Altec Lansing ACS-90 speakers, and either a 33.6-kbps modem or a 3Com 10/100 ethernet card (a nice option for budget-minded businesses). The big compromises are the 14-inch (12.9-inch viewable area) monitor and the S3 Trio64–based PCI video card with only 1MB of video memory, which delivers 1024 by 768 resolution at 256 colors.

For businesses willing to sacrifice multimedia frills for a nicer display, the Baby Grand TCO ships without a CD-ROM drive, sound card, or speakers, and comes standard with the ethernet card only. However, the system's basic configuration includes 32MB of EDO RAM, a 15-inch monitor (a $99 option with the CS), a video card with 2MB of memory, and Intel LANDesk software for remote system management.

Both Baby Grands are well-built systems that use industry-standard components. The line is not designed for advanced graphics or heavy-duty applications; the TCO's lack of a CD-ROM drive will be a problem if you want to install applications that come on the discs. But for basic home, SOHO, or business use, these are solid systems at a bare-bones budget price.

—*Stan Miastkowski* ▶

Seanix Baby Grand CS and TCO

PRO: MMX technology for less than $1000.

CON: Small monitor, limited graphics card on CS; no CD drive on TCO.

VALUE: Good features, fair price.

Seanix

800/555-4031, 712/233-3278 (fax)

www.seanix.com

List price: $999

READER SERVICE NO. 762

INTRIGUED? IN THE BLINK OF AN EYE. IT'S GONE. THE 195HP V6 FOR POWERFUL PASSING. THE HIGH-PERFORMANCE SUSPENSION, FOR A SUPERB RIDE. THE TRANSMISSION THAT SHIFTS IMPERCEPTIBLY. THE RESPONSIVE, VARIABLE-EFFORT STEERING, FOR PRECISE HANDLING. ALL THAT REMAINS IS THE BURNING DESIRE TO DRIVE IT.

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www.acer.com/aac/

Alps' Challenger to the Ink Jet

PRINTER

INK JET PRINTERS have had a long-running monopoly on glorious color at an affordable price. Now a printer using ink-imbued ribbon cartridges is poised to compete.

The "micro-dry" inks in Alps Electric's **MD-1000** don't splatter or soak into the paper, so you can get great color without feeding it the expensive coated paper that ink jets prefer. Special ribbons let you add metallic accents or a glossy photo finish, and when a color runs out you have to replace only its cartridge; the cartridges on most budget ink jets hold three colors and must be completely replaced when any color is exhausted.

Up to now, Alps printers have been somewhat pricey: The cheapest cost $549. But the MD-1000 is street priced at $349, putting it squarely in economy ink jet territory. With coated paper, however, new budget ink jet printers handily match the colors and textures of the preproduction MD-1000 I tested.

This printer really excels with text, producing perfectly defined letterforms—especially impressive at its maximum resolution of 1200 by 600 dots per inch. The MD-1000 also allows you to add multiple colors by printing in so-called Overlay Mode, switching ribbon cartridges after printing the standard cyan, magenta, yellow, and black. Setup can be tricky, but the excellent manual explains it well. (A four-color ribbon lets you print up to seven colors at a time.)

Weaknesses? Performance is very slow. Alps rates the MD-1000 at 2 pages per minute in monochrome at 300 or 600 dpi—much slower than rated speeds of several equivalent ink jets. The ink is rather delicate and scratches off easily. Finally, the MD-1000 is surprisingly noisy.

—Dan Littman

Alps MD-1000

PRO: Splatter-free printing; glossy finish and metallics available.

CON: Slow, noisy.

VALUE: Good value for a unique technology.

Alps Electric

800/825-2577

www.alpsusa.com

Street price: $349

READER SERVICE NO. 765

QUICK TAKES

Lexmark's $139 Color Printer

FOR A bargain-basement street price, the Lexmark 1000 Color Jetprinter is fairly versatile, especially for school or family use. This $139 color ink jet can print on banners up to ten pages long or on T-shirt transfers; its 600-dpi resolution is high enough to handle both text and color images capably. But the 1000 Color Jetprinter's minimalist design has some drawbacks. It has neither an output tray nor an on/off button—just a reset switch. Its input guide, a stiff plastic outcropping from the rear of the printer, looks very breakable. And it can hold only one ink cartridge at a time, so you have to swap black and color supplies between print jobs. Lexmark International; 800/358-5835; www.lexmark.com.

READER SERVICE NO. 766

—Melissa Riofrio

Diamond Multimedia's Mouse That Soared

INPUT DEVICE

DIAMOND MULTIMEDIA'S new wireless mouse will work almost anyplace you want it to. Set the **GyroMouse** on your desk and it functions like a standard-issue mouse; pick it up and click the button on its underbelly, and it operates airborne up to 30 feet away from its cradle. At $100 it's pricey, but it's great for presentations or couch potato–style surfing.

Named for miniature built-in gyroscopes that track hand movement, the charcoal-gray GyroMouse is slimmer and slightly longer than a Microsoft mouse—but at 5.5 ounces it feels pleasingly solid. Installation simply involves hooking up the base unit to your computer's PS/2 or serial mouse port, and plugging in an AC adapter. The GyroMouse works with standard Microsoft or Logitech mouse drivers.

DESK OPTIONAL: The wireless GyroMouse works up to 30 feet from its cradle.

The GyroMouse communicates with its base unit by radio, so the cradle doesn't have to be within line of sight, as it does with infrared devices. The preproduction unit I tested ran out of power after 5 or 6 hours, but Diamond says shipping versions will operate for up to 8 hours without recharging (which takes 4 hours in the cradle). The unit shuts down automatically after sitting idle for 15 minutes.

Some quibbles: To operate the mouse off the desk, you can either keep the "belly" button depressed, which can get tiring, or double-click the button to keep the cursor active, which results in some drift when the cursor rests (something Diamond says will be fixed in the final version). Also, a slight lag in cursor response time makes the GyroMouse a poor choice for fast-moving games.

—Yardena Arar ▶

GyroMouse

PRO: Wireless, works on or off the desktop, software not required.

CON: Not great for high-speed games, expensive.

VALUE: Worthwhile if you're an occasional presenter.

Diamond Multimedia

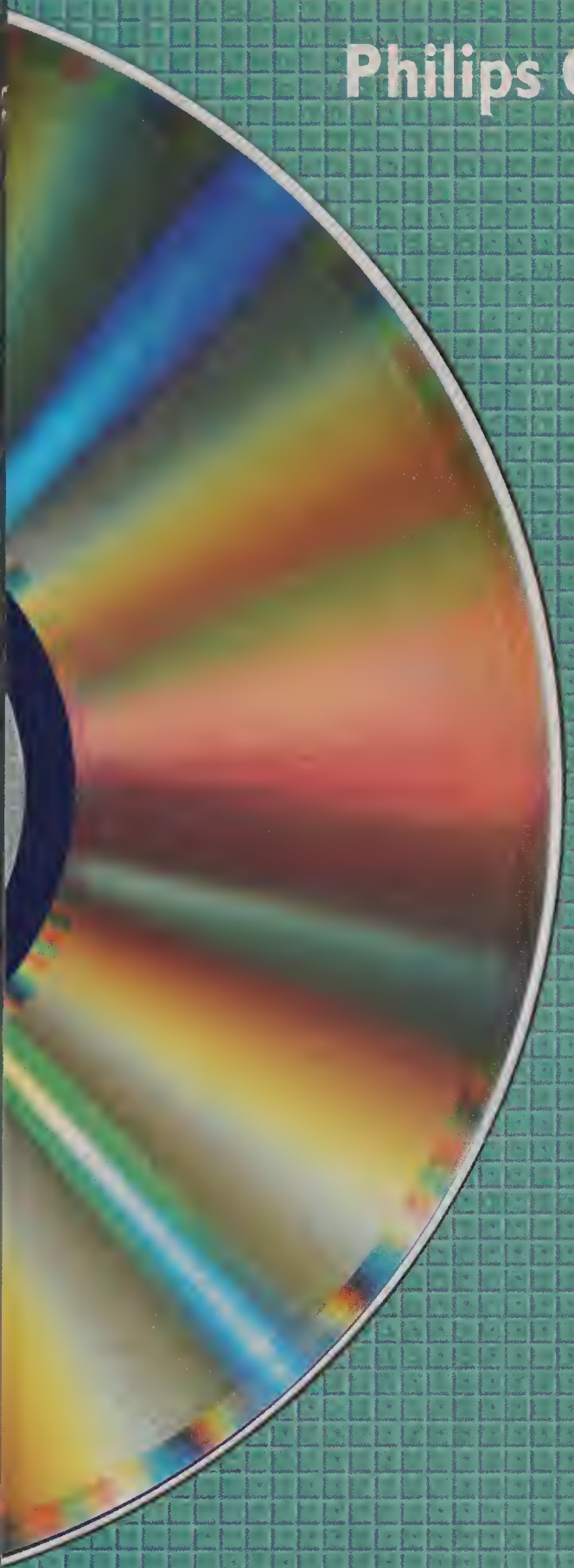
800/468-5846

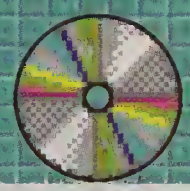
www.diamondmm.com

Street price: $100

READER SERVICE NO. 767

Create a CD on your PC with the Philips CD-ReWritable Drive.





Onita Mihaly

My Web Site

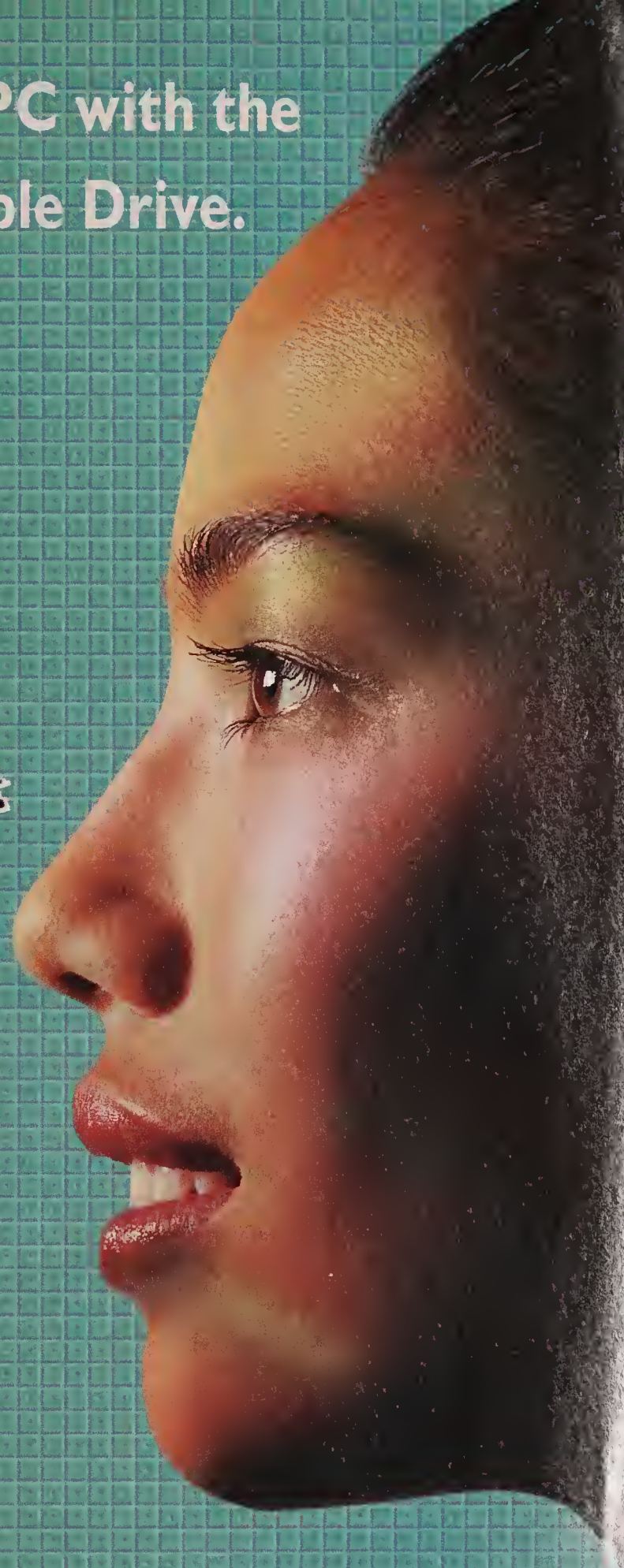
Annual Budget

Vacation Video

Work Stuff

My New Song

COMPACT disc Recordable ReWritable



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AITech's AirLink Puts Your PC on Your TV

PRESENTATIONS

WEB TV AND other set-top boxes bring the Internet to the small screen, but what about everything else you do on a computer? AITech International's $399 **PC/TV AirLink** lets you view presentations, play games, and surf the Web on your television set.

An inexpensive and unique alternative to dedicated presentation devices (or crowding around a small notebook screen), the PC/TV AirLink is a digital-to-analog scan converter that beams audio and video signals from a radio transmitter attached to your computer's VGA-out port and sound card to a receiver hooked up to a TV—up to 100 feet away.

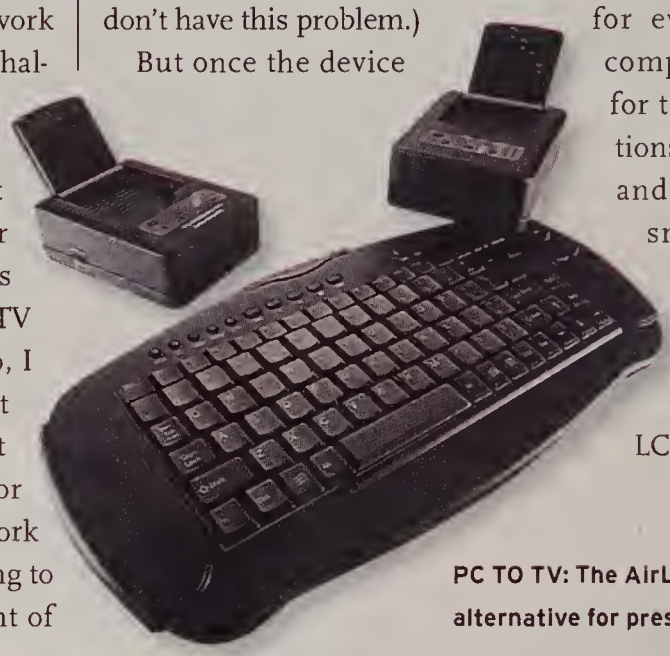
In addition to the lightweight, Walkman-size radio transmitter and receiver, the kit has a wireless, battery-powered keyboard with integrated joystick that communicates with the PC by three-way relay —infrared to radio receiver, UHF to radio transmitter, and infrared to a small receiver that attaches to the mouse and keyboard ports.

Hooking up a preproduction unit was easy. I attached the transmitter and IR keyboard receiver to a notebook, then hooked the radio receiver to the TV's audio/video ports.

Getting everything to work properly was more of a challenge. When I first powered up the kit, the TV, and the notebook, I got nothing but static. After resetting the notebook's display and changing the TV setting from TV to video, I got a desktop image, but the notebook display went dark—less than ideal for presenters who like to work with a notebook. According to AITech, about 70 percent of current notebook PCs will not support simultaneous viewing. (Desktop systems don't have this problem.)

But once the device was up and running, I found the infrared keyboard responsive and fun to use. For viewing text and spreadsheets, the low resolution of a boob tube makes it a poor substitute for even the smallest computer display. But for training, presentations, software demos, and Web surfing in small groups, the PC/TV AirLink is a low-cost alternative to large CRTs or high-price LCD projectors.

—Julie Campagna



PC TO TV: The AirLink offers a budget alternative for presentations.

PC/TV AirLink

PRO: Economical, lightweight.

CON: Can't view desktop simultaneously on TV and most notebooks; text is difficult to read.

VALUE: Affordable option for small group presentations.

AITech International

800/882-8184

www.aitech.com

List price: $399

READER SERVICE NO. 768

Diamond's DVD Kit: An Interim Solution

DVD-ROM

DIAMOND MULTIMEDIA'S first entry into DVD-ROM lugs the baggage of all first-generation DVD-ROM kits. Because it uses Toshiba's original SD-M1002 DVD-ROM drive, the **Maximum DVD Kit** can't read CD-Recordable discs; and by Diamond's own admission it spins CD-ROMs at less-than-dazzling 8X speed. Second-generation DVD-ROM drives, which don't have these problems, may be available by the time you read this, and should offer more value for the money. But if they're delayed, the $600 Maximum kit is worth considering.

The kit includes a full-length PCI-based DVD decoder card (make sure you have a free PCI slot with plenty of room around it) that supports MPEG-2 and Dolby AC-3 Surround sound. Unlike Dynatek's DVD471TII (see September's *New Products*), which requires no additional connections but works only with certain video cards, the Maximum uses a pass-through cable from the back of your video card to the DVD decoder board, so it can work with just about any video card. Simply attach the pass-through cable and connect your monitor to the DVD card instead of your video card. You'll need a Pentium-120 Windows 95 system with at least 16MB of RAM.

The Maximum's documentation is packed with photos, illustrations, and step-by-step installation instructions. The DVD-ROM titles that came with the shipping unit I examined include Electronic Arts' Wing Commander IV, Silent Steel by Tsunami, Activision's Spycraft, and Xiphias's Encyclopedia Electronica. Diamond's sophisticated DVD Navigator software allows you to display subtitles, pick camera angles, and search forward and backward on discs that support these features.

As a CD-ROM replacement Diamond's Maximum DVD Kit falls a little short. But if you can't wait for that impressive DVD sound and video, this product will get you going within 15 minutes.

—Dean Andrews ▶

Maximum DVD Kit

PRO: Great DVD control software, solid bundle.

CON: Slow CD-ROM speed, no CD-R playback, expensive.

VALUE: Worth it only if you can't wait for second-generation kits.

Diamond Multimedia

800/468-5846

www.diamondmm.com

Street price: $600

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Sony's Budget Portable LCD Projector

PRESENTATIONS

IF YOU DO small-group presentations on the road, Sony's **CPJ-D500** portable projector may be just what you need. Instead of huddling around a notebook, your audience can sit comfortably and even take notes while viewing a much larger projected image (from 2 to 5 feet diagonal). This $1999 device won't replace boardroom or conference hall LCD projectors that cost three times as much, but it's a welcome option for groups of four to six people.

SONY'S $1999 CPJ-D500 is the cheapest portable LCD projector on the market.

The CPJ-D500 is compact (4 by 8 by 12 inches), lightweight (8.3 pounds), and easy to use. It accepts video (RGB, composite video, S-Video) and stereo-audio input. For sound, you can either use the built-in speaker or connect the unit to external speakers (not supplied). Equipped with an f1.8 lens, an internal 1.3-inch LCD panel, and an 80-watt metal-halide lamp, the shipping unit I tested performed fine in a room lit well enough for viewers seated 3 to 8 feet from the projected image to take notes.

The CPJ-D500's biggest limitation: It projects only 640 by 480 (VGA) resolution. It doesn't accept 1024 by 768 input at all, and 800 by 600 images are compressed to VGA resolution, which often impairs text legibility. There's no zoom lens or remote control, both common in costlier LCD projectors.

Nonetheless, the CPJ-D500 may be worthwhile for many on-the-go presenters. It's the first and only LCD projector designed specifically for small groups, and it's so inexpensive that a company could buy three units for roughly the price of the next cheapest LCD projector on the market.

—*Richard Jantz*

Sony CPJ-D500

PRO: Affordable LCD projector; ultraportable; accepts PC, video, and audio input.

CON: Projects VGA resolution only, no zoom lens or remote control.

VALUE: Good for presentations to small groups.

Sony Electronics Inc.
800/352-7669
www.sony.com/technology
Street price: $1999

READER SERVICE NO. 770

QUICK TAKES

Sling Along

DOES YOUR notebook carrying case protect your machine or just cover it up? Insurance companies say more than 1000 portable PCs are broken in transit daily—almost all of them in foam-padded cases. Luggage manufacturer Tumi's Safecase includes Port's Safeport, a suspended neoprene sling that lets the notebook bounce rather than crash to the bottom of the case. The Safecase has been proved effective to drops of 2.5 feet; most padded luggage can handle only half-foot drops. Available in ballistic nylon or leather, the Safecase comes in 12 styles costing $250 to $550; deluxe versions offer zippered expansion slots roomy enough for an overnight wardrobe, and a rear accordion file. Tumi; 800/322-8864.

READER SERVICE NO. 771

—*Michael S. Lasky*

Number Nine's Graphics Revolution

GRAPHICS CARD

NUMBER NINE'S high-powered Imagine 128 graphics accelerator has been eclipsed by a faster, more affordable successor—the aptly named **Revolution 3D.** Based on what the company calls its Ticket to Ride coprocessor, the Revolution 3D provides the kinds of 3D features you see on gaming cards, along with Number Nine's 128-bit acceleration—which is nimble with high-resolution 2D graphics and video. The $299 price tag may be lofty for a card with 4MB of WRAM, but it's nowhere near the $500 shockers we've seen regularly in the Imagine 128 line. If you work with professional graphics programs or dabble in 3D modeling, the price is right.

At the PC World Test Center, an early version of the Revolution 3D outperformed all other tested boards at speeding up 2D programs. In addition, the board played full-screen MPEG video clips at high resolutions flawlessly.

However, 3D performance was mixed. The Revolution 3D ran the Monster Truck Madness game as well as any board we've seen. But it had trouble performing alpha blending operations in Independence Day (for an explanation of 3D tests and features, see "2D and 3D Graphics Boards: You Can't Always Get What You Want"). We've encountered a similar problem with several other boards and expect it to be fixed when the drivers are finalized.

Ultimately, though, you wouldn't buy the Revolution 3D just for games; better game cards can be had for less money. Although the board can handle any chore, it sets itself apart in graphically intense applications.

—*Brad Grimes* ▶

Number Nine Revolution 3D

PRO: Fast at high resolutions, great video playback.

CON: Pricey for regular business programs or games.

VALUE: Excellent choice for desktop publishing or other high-end graphics.

Number Nine
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www.nine.com
Street price: $299

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Circle 95 on reader service card

QuarkXPress 4.0: Welcome Upgrade

DESKTOP PUBLISHING

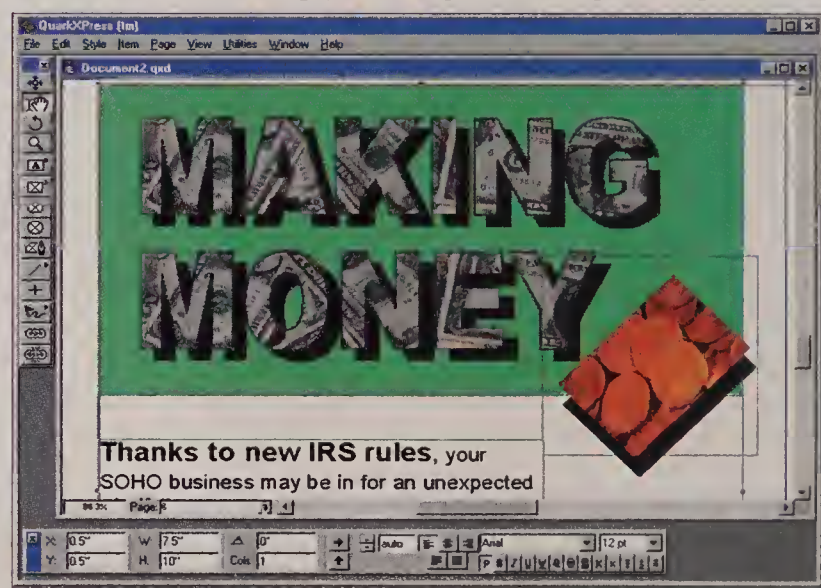
QUARKXPRESS HAS long been favored by graphics pros who create short, design-intensive publications, but Quark's flagship product has not had a full upgrade in years. In the meantime, arch-rival Adobe PageMaker (now on version 6.5) has pulled ahead with significantly improved layout, color printing, and electronic publishing features. The big question about **QuarkXPress 4.0** for Windows 95 and NT (and the Mac) is whether it has the right stuff to attract new users or woo die-hard PageMaker fans.

The beta I reviewed (the shipping version is due by the end of the year) showed that QuarkXPress has caught up with PageMaker in several areas, including layout and color printing, and it's bound to retain its status as the professional designer's darling. But it still lacks built-in electronic publishing features that PageMaker provides, such as the ability to produce HTML pages with hyperlinks. Astrobyte makes an Xtension (a third-party add-on for QuarkXPress) that does this for the Macintosh version; its Windows counterpart should be out by the time you read this and will likely cost about $495.

GRAPHICS GALORE: QuarkXPress 4.0's built-in Bézier tools and other new graphics features make it a designer's delight.

QuarkXPress 4.0 is the first 32-bit version of the program; Windows 3.*x* is no longer supported. The interface has been enhanced with pop-up tools, tabbed dialog boxes, and right-click shortcuts. For example, you can now right-click a picture or text box and quickly access a single dialog box to modify the element's position, size, angle, frame, runaround features, and more. You can also click an Apply button to try things out before proceeding—a real plus for beginners, since the Edit menu's Undo command applies only to the last discrete change.

Among the program's most dramatic new features are Bézier-based tools that can be used to create complex drawings and effects that used to require a separate graphics package such as Macromedia Freehand or Adobe Photoshop. Other graphics goodies include sophisticated merge and split commands (for combining or separating multiple shapes), eye-catching text paths, and a Text to Box command that converts characters into Bézier-outline boxes (to create, for instance, display type filled with an image).



FILL 'ER UP: A new Text to Box command lets you convert display type into boxes, which can then be filled with images.

Business users haven't been forgotten. Long-document features that used to require an Xtension—table of contents and index generation, combining several QuarkXPress files into one document—are now built into the program. Other welcome additions include an enhanced Find and Change function, a print style manager (for using different printer descriptions), and character-based style sheets that make it a snap to format a single character, such as a fancy drop cap to start a story or a paragraph.

QuarkXPress 4.0 uses a different file format from its 3.3*x* predecessor, but you can save 4.0 files as 3.3*x* files. (Elements created with new 4.0 features will be modified so the document looks as much like the 4.0 version as possible.) Files created in Windows and Mac versions of QuarkXPress 4.0 can be opened on either platform.

All in all, however, this program lacks the knockout punch needed to topple PageMaker as the desktop publishing favorite for general users, particularly given PageMaker's lower price ($895 compared to $995) and built-in electronic publishing tools. But for designers and graphics pros, this is a must-have upgrade.

—Richard Jantz ▶

QuarkXPress 4.0

PRO: 32-bit version, Bézier-based drawing tools, improved long-document support, character-based styles.

CON: Expensive, requires add-ons for Web publishing tools.

VALUE: Still the program to beat for designers and graphics pros.

Quark Inc.
303/364-5735
www.quark.com
List price: $995 (upgrade price not available at press time)

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Web Site Packages From Microsoft, Symantec

WEB AUTHORING

WEB SITE DESIGN and management packages evolve faster than any other software. **FrontPage 98,** Microsoft's third revision of this product in only a year, and **Visual Page,** Symantec's initial foray into this field, are respectively the Boeing 747 and the Piper Cub of this industry. Both can get you from point A to point B, but FrontPage 98 does it more quickly and more powerfully.

Priced at $80, Visual Page should fare well against its principal competitors, Adobe PageMill and Claris Home Page. A solid WYSIWYG editor with basic site management thrown in, it boasts readily customizable tables (key tools for Web page creation), image-map editing (placing "hot" spots in a graphic), frame creation, and drag-and-drop link creation. Unfortunately, it has no spelling checker and only one font, and its templates and clip art are rudimentary and dull.

PICK THE LOOK YOU LIKE: Microsoft FrontPage 98 offers a choice of graphics themes for all elements of your Web site.

Visual Page targets small-business owners or hobbyists. It makes creating polished-looking Web pages easier than with Home Page; the lower price and tools for uploading pages give it a leg up on the $99 PageMill.

Meanwhile, FrontPage continues to expand its feature set. This is an elegant program with many leading-edge tools and clever implementation of standard features.

With FrontPage 98's wizards and templates, even first-timers can easily create a stunning multipage site. Table location and layout are now pixel-specific, all TrueType fonts are supported, and text can be overlaid on images. Minor drawbacks are the program's typically Microsoft bulk—82MB for a full install—and lack of drag-and-drop capability to create hyperlinks. Site management may be the most powerful feature, with automatic hyperlink updates, Web server software to test or host your Web site, and site navigation map options.

Power users will find the new HTML editor helpful, and FrontPage 98 offers all the latest tools: Java applets, ActiveX controls, and cascading style sheets. A few Internet Explorer–specific tools allow animated text and push technology.

At $149, FrontPage's only competition is Adobe PageMill, which has nowhere near as many features. NetObjects Fusion is more powerful but also costs significantly more. FrontPage's ease of use and extraordinary power make the perfect combination for the full spectrum of users, especially those with high aspirations but minimal experience.

—Jeff Sengstack

BASICS ON A BUDGET: Symantec Visual Page's simple templates and graphics are best suited for small businesses or hobbyists.

FrontPage 98

PRO: Powerful, full featured, up-to-date tools.

CON: Poor drag-and-drop support, hogs hard disk.

VALUE: Great for all types of users.

Microsoft Corp.

206/882-8080

www.microsoft.com/frontpage/

Street price: $149 ($40 rebate available to users of Microsoft Office and its applications), upgrade $54.95

READER SERVICE NO. 774

Visual Page

PRO: Strong basic WYSIWYG Web page editor, site management tools.

CON: Only one font, boring templates, no spelling checker.

VALUE: Solid, low-price tool for hobbyists and small businesses.

Symantec Corp.

800/441-7234

www.symantec.com/vpage/index.html

Street price: $80

READER SERVICE NO. 775

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NEED A quick pickup for your presentations or Web pages? NEC Systems Laboratory's $59 NetMC is a point-and-click tool for adding multimedia to Microsoft PowerPoint presentations or any HTML document. It comes with more than 1000 audio and video samples to get you started—everything from snazzy videos of your favorite city to obnoxious animated characters. NetMC is a fun, inexpensive, and easy-to-use package for novice Web site developers or for jaded PowerPoint users who are tired of flat presentations. NEC Systems Laboratory; 408/433-1358; netmc.neclab.com.

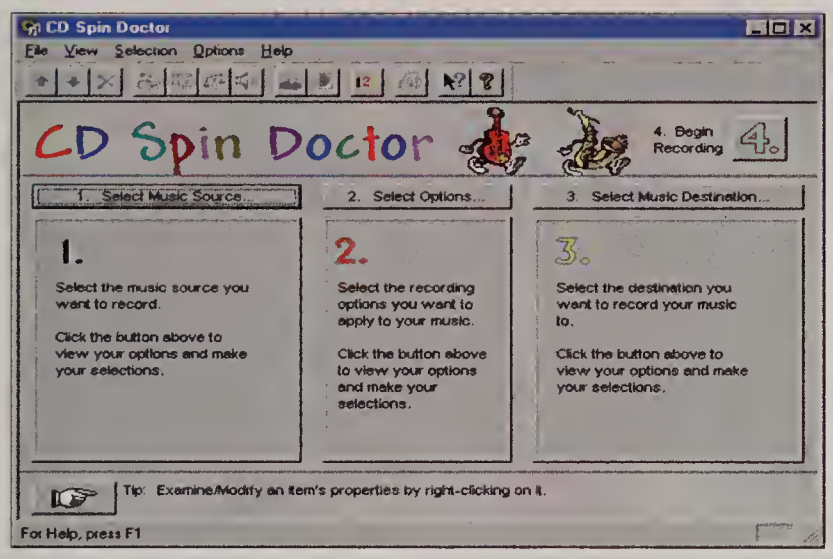
READER SERVICE NO. 776

—Joe Gomolski

Put Your Old Vinyl LPs and Tapes on CD

CD-RECORDABLE

CD-RECORDABLE drives are becoming more popular, but the bundled software is too often limited in functionality or hard to use. Adaptec's **Easy CD Creator Deluxe,** a $99 successor to CD Creator and Easy-CD Pro, tackles these problems. It works with Windows 95 and NT and with many CD-R and CD-Rewritable drives to let you create photo discs, video discs, backup copies of CD-ROMs, and labels for CD cases.



DISC JOCKEY: CD Spin Doctor is one of several Easy CD Creator Deluxe modules that help make the most of your CD-Recordable drive.

But Easy CD Creator Deluxe really shines with its audio recording module, CD Spin Doctor. You can easily compile new discs from your favorite audio CDs (for the best quality, you'll need a CD-ROM drive with digital audio extraction, usually found in high-end models). You can even create audio CDs from vinyl LPs and tapes—just hook your stereo up to your sound card. There's also a utility to remove clicks, pops, scratches, and hiss. But for best results, you'll need a high-quality sound card.

CD-R drives are still great for data storage and backup. But if you want to do more, Easy CD Creator Deluxe blows the competition away.

—*Stan Miastkowski* ▶

Easy CD Creator Deluxe

PRO: Easy to use, multipurpose CD-Recordable software.

CON: Doesn't record well off cheap sound cards.

VALUE: A useful, versatile upgrade from bundled CD-R software.

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800/442-7274

www.adaptec.com

List price: $99

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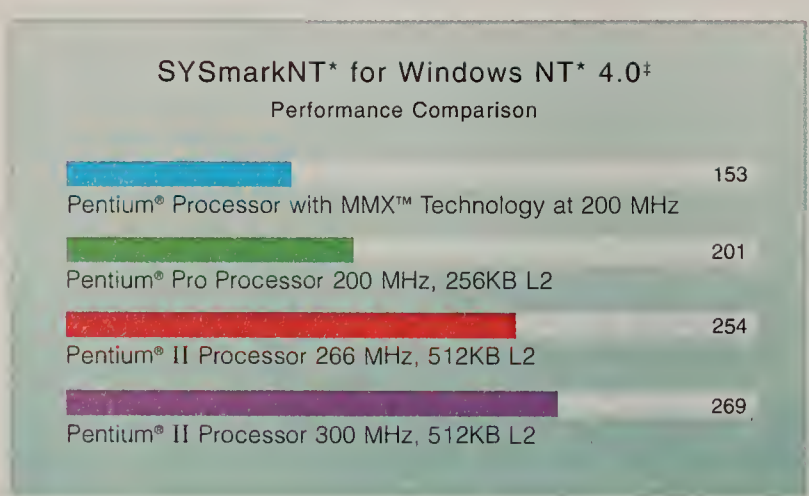

► www.intel.com/PentiumII

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CD-ROM Audio Dictionary

C D - R O M

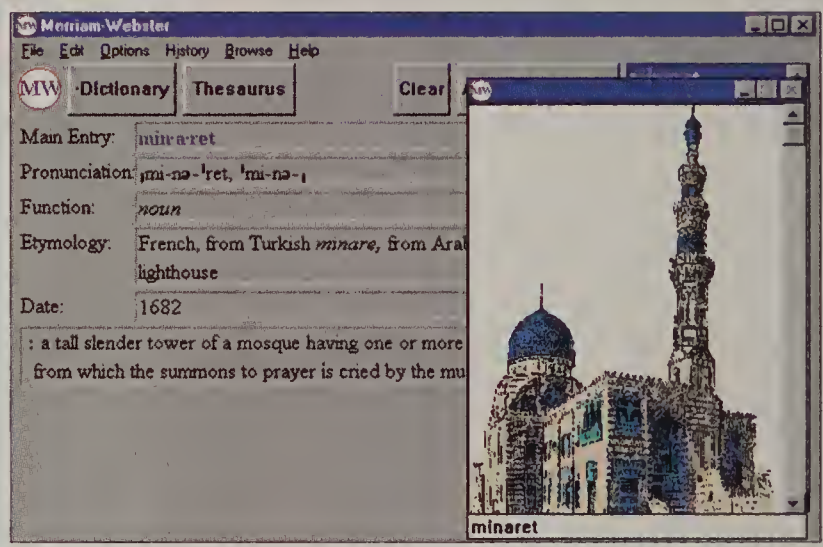
Merriam-Webster's Collegiate Dictionary Deluxe Audio Edition. Figures—let dictionary people name their product, and they deliver 20 syllables.

Luckily, the name is the only unwieldy element of this excellent $40 CD-ROM dictionary. In addition to the 160,000-entry Collegiate Dictionary, you get Merriam-Webster's Collegiate Thesaurus, audio pronunciations of more than 100,000 words, and photos and illustrations.

The M-W Link program lets you highlight a word in any other Windows application—a word processor or e-mail program, for example—and launch the dictionary (or thesaurus) with a customizable keystroke command. This brings up a window with the definition, pronunciation, and etymology, or, for the thesaurus, a list of synonyms. Click on the entry to hear the recorded pronunciation, including variants. The program also has 21 different options for looking up words, including by part of speech, language of origin, or pronunciation via a rhyming dictionary. You'll need 2MB to 40MB hard disk space; the more you install, the faster it runs.

If you're willing to trade a thesaurus and some search options for a much larger audio dictionary, check out the similarly priced Random House Webster's Unabridged Dictionary, which boasts 315,000 written entries and 120,000-plus pronunciations. Or, for an occasional definition, bookmark Merriam-Webster's Web site (www.m-w.com/dictionary).

—*Glenn McDonald* ▶



MERRIAM-WEBSTER'S NEW CD-ROM dictionary provides audio pronunciations for more than 100,000 words.

Merriam-Webster's Collegiate Dictionary Deluxe Audio Edition

PRO: Speedy, includes thesaurus, sophisticated search options.

CON: Fewer entries than Random House's dictionary.

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PhotoDeluxe 2.0: Quick, Easy Photo Editing

IMAGE EDITING

IT DOESN'T TAKE much time or talent to create cool digital photos for brochures, newsletters, or Web pages with **PhotoDeluxe 2.0,** an impressive $49 sequel to Adobe Systems' popular program. A polished interface and several new tools and special effects make this a worthwhile upgrade for current users, and a stronger competitor to Microsoft Picture It and other low-cost photo editors.

Like its predecessor, PhotoDeluxe 2.0 provides step-by-step, wizardlike procedures that simplify common photo touch-up tasks (such as removing scratches) and make it easier to add special effects (curling pages, changing backgrounds, and many more). The most impressive new features include automated red-eye removal; a clone tool for duplicating photo elements; and SmartSelect, which automatically outlines objects—a godsend for creating collages. Older tools are also easier to use: A new toolbar above each photo window affords faster access to zoom, delete, text, undo, and other commands.

I would have liked the pre-production version I checked out even more if it had offered a multistep undo command (rather than one-step undo) for trying out different editing and effects combinations. I also wish you could reduce or hide the on-screen menu panels to make more screen room, thereby eliminating some of the scrolling and zooming that the limited work space necessitates.

But all in all, PhotoDeluxe 2.0 is one of the best entry-level photo editors available, combining practical tools and jazzy special effects.

—*Richard Jantz*

PHOTO EDITING BY THE NUMBERS: Step-by-step guides in Adobe's $49 PhotoDeluxe 2.0 make creating photo collages easy.

PhotoDeluxe 2.0

PRO: Easy step-by-step guides, cool special effects, low price.

CON: Lacks multistep undo; limited work space.

VALUE: Great choice for photo editing neophytes.

Adobe Systems Inc.
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www.adobe.com
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READER SERVICE NO. 778

Paradox 8: A Perfect Fit for WordPerfect Suite

DATABASE

WITH THE RELEASE of **Paradox 8,** Corel's database workhorse finally becomes a full-fledged member of Corel's business application suite.

While Paradox 7 was part of Corel Office Professional 7, it was not integrated with the other applications. Now, however, users of WordPerfect Suite 8 Professional (the successor to Corel Office Professional) can launch WordPerfect and Quattro Pro documents from within Paradox. Merging Paradox data into WordPerfect documents and Quattro Pro spreadsheets has also been simplified. The standard edition of WordPerfect Suite still does not include a database program, but if you buy Paradox 8 separately, the integration benefits still apply.

Corel has added new Experts (guides like Microsoft's wizards that walk you through various tasks) to make Paradox easier for all levels of users. However, like Microsoft's Access 97, this is a big program that takes some time to learn; novices may find it intimidating. New features that bring Paradox more into line with Access 97 include an Expert that helps with design tasks such as changing field colors and borders, Experts for publishing database information to the Web and documenting databases, and 20 additional built-in styles for forms and reports. Paradox 8 also lets you use data from Microsoft Access directly.

Paradox programmers looking for high-end tools should be pleased with the Enterprise edition, slated for fall release. It includes a regular $299 Runtime version (which in turn has a Java Runtime version that lets you run Paradox apps from different platforms, including Windows 3.*x* and 95, Macintosh, DOS, and UNIX) and the Peer Direct Database Replication tool for client-server applications.

In the past, WordPerfect Suite users had to think long and hard about their database choice. With the release of Paradox 8, there's no reason to stray from the suite.

—*Celeste Robinson*

For more information about a product, contact the manufacturer or circle the number on the reader service card. ■

Paradox 8

PRO: Good integration with other WordPerfect Suite applications.

CON: Interface is confusing in some places; not for all novices.

VALUE: Solid choice for WordPerfect Suite users.

Corel
800/772-6735
www.corel.com
Street price: $129, Enterprise edition $1995, Runtime edition $299

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Overall Rankings

PC VENDOR	GRADE
Quantex	Excellent
Dell	
Hewlett-Packard	
IBM	
Compaq	Good
Gateway 2000	
Micron	
NEC	
Acer	Fair
AST	
Toshiba	
AT& T	Poor
Digital	
Packard Bell	

Windows Magazine, 8/97

Solving Problems

VENDOR	DAYS TO RESOLVE PROBLEMS
Quantex	11
IBM	12
Compaq	13
Dell	14
Hewlett-Packard	14
NEC	14
Acer	16
Micron	17
AST	17
AT& T	20
Gateway	21
Digital	27
Packard Bell	27
Toshiba	37

Windows Magazine, 8/97

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Quantex	91%
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NEC	71%
AT& T	69%
Digital	69%
Toshiba	61%
Compaq	58%
Packard Bell	51%

Windows Magazine, 8/97

"Quantex, making its debut in the desktop category, quickly resolves its callers' problems an impressive 47 percent of the time, compared with the survey average of 31 percent."

PC Magazine 7/97

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- Smart Lithium Ion Battery
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- MS Windows '95
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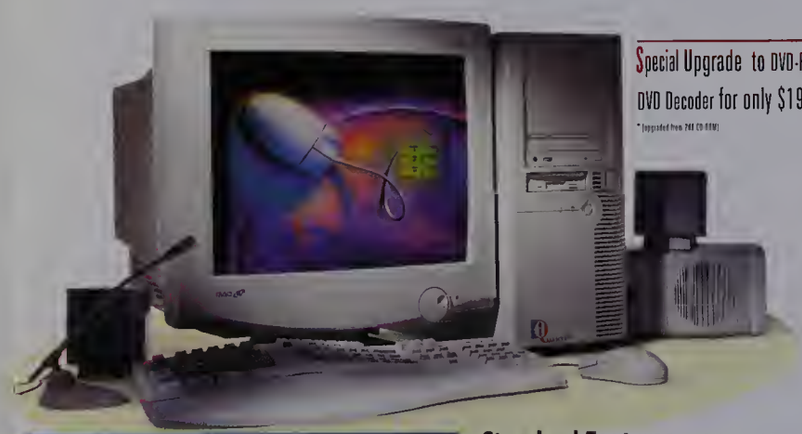
QP6/233 SM-4x (featuring Pentium II processor)$299
QP6/266 SM-4x (featuring Pentium II processor)$314



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QP5/166 WS-2(with MMX™ Technology).....$1599
QP5/200 WS-2(with MMX™ Technology).....$1699

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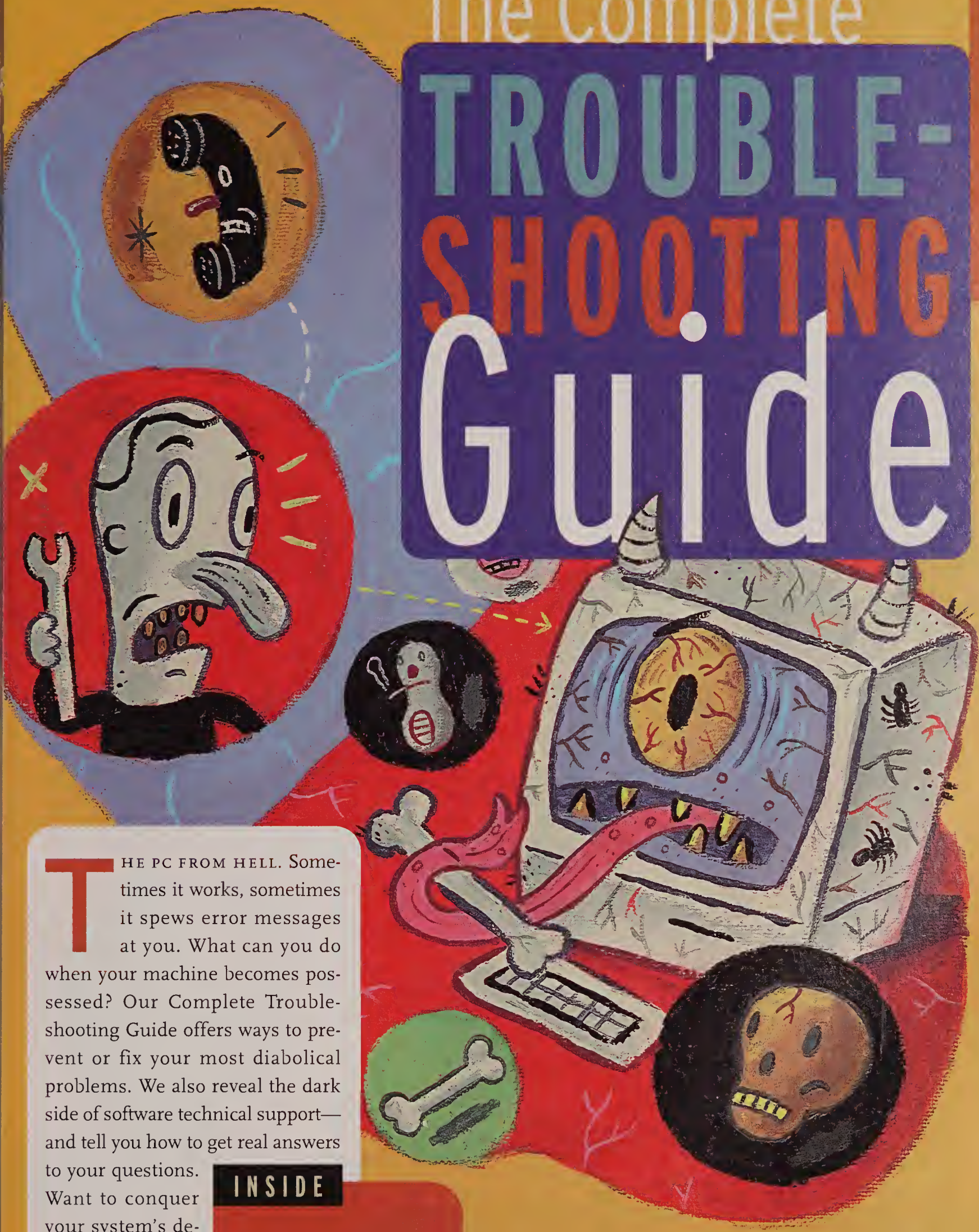
The Complete TROUBLE-SHOOTING Guide



THE PC FROM HELL. Sometimes it works, sometimes it spews error messages at you. What can you do when your machine becomes possessed? Our Complete Troubleshooting Guide offers ways to prevent or fix your most diabolical problems. We also reveal the dark side of software technical support—and tell you how to get real answers to your questions. Want to conquer your system's demons? Read on. ▶

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BASE MAN

TROUBLESHOOTING

The best call to tech support is the one you never make. Here's how to crashproof your PC and recover from disaster if it strikes.

BY LINCOLN SPECTOR

HOW TO KEEP YOUR PC Trouble-free

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COMPUTERS ARE EVIL. They make your life easier, they create a dependency, and then—just when you need them most—they eat your data. Or they catch a virus, lose important files, or just plain crash, leaving you looking forward to a long cozy evening on the phone with tech support.

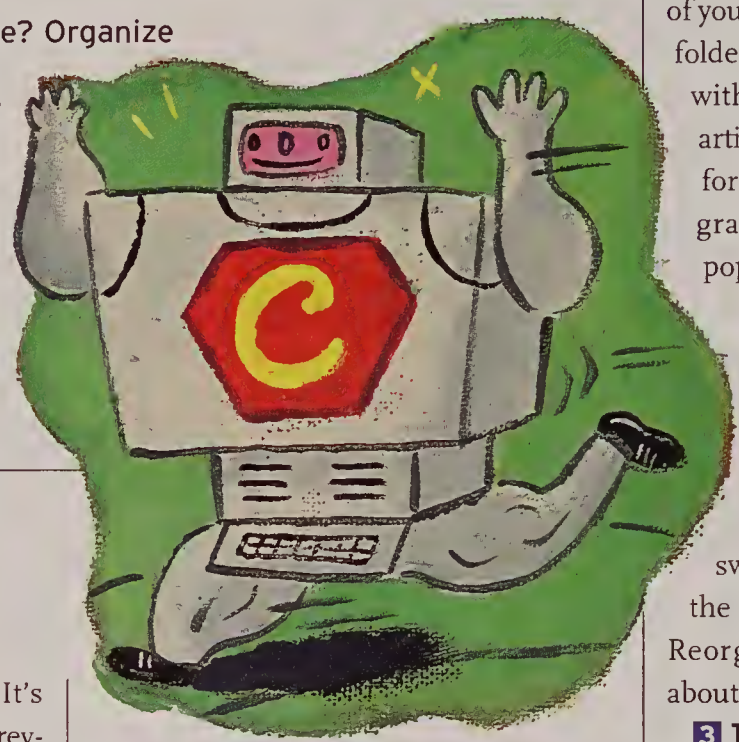
It doesn't have to be this way. Over the years I've learned a few tricks for keeping a PC's more malicious tendencies at bay. I'll show you how to organize your hard drive and keep it running smoothly, how to protect your data, and how to set up a regular schedule of backups and system maintenance. I'll also advise you on the essential software tools for diagnosing and curing a sick PC. You'll learn how to zap the most common bugs, what books to consult to troubleshoot your PC problems, and which newsgroups to check out when you need a second (or hundredth) opinion.

I can't promise that you'll never need to call tech support again, but if you follow the advice here, you'll do it a lot less often. ▶

Hard Disk Housekeeping

BAD THINGS EVENTUALLY happen to every PC. Your power supply could conk out. Your monitor tube might blow. But if your hard disk dies and you're not prepared for it, you could lose months or even years of hard work.

The best way to prevent trouble? Organize your data so it's easy to back up. You'll also need to defrag your files and scan the drive's surface on a regular basis. And you may want to partition the disk to use its space more efficiently.



Organize Your Data

SPECTOR'S RULE Number 1: It's your data. You can put it wherever you want. And the best place to keep the files you've created is in one *master data folder*, with subfolders for files related to individual projects.

That way, if you don't have time to back up your entire hard drive, you can quickly duplicate your most precious files. If you want to take a project home or on the road, you simply copy the contents of a single folder. And if you need to find all the files that contain the name *Irving*, you can search your data folder and its subfolders a lot faster than you can your entire drive.

Here are four quick steps for organizing your hard drive around your work:

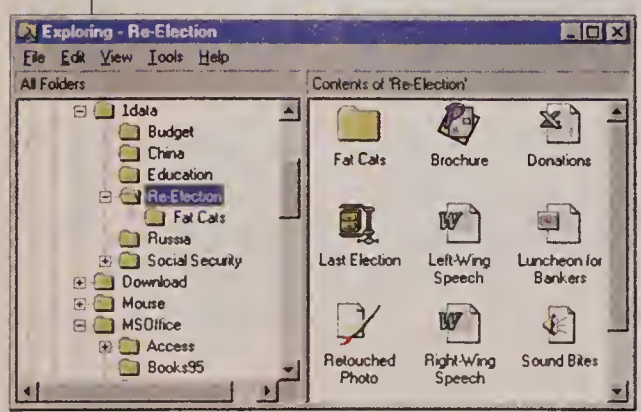
1 Create a master data folder. Start by making a single data folder off your hard drive's root. I call mine Articles, which probably doesn't mean much to you unless you write for magazines. If you call yours 1data, it will appear near the top of your file directory, so you won't have to scroll down to find it.

HOT TIP Microsoft Office 95 and 97 automatically create a folder called C:\My Documents, where they save all your data files. If you change the name of My Documents to 1data (or whatever), Office applications will continue to store all your data files there.

2 Create subfolders and move your files. Of course, storing *all* your data files in one big folder can get pretty unwieldy. Create subfolders within 1data; if you're an accountant, for example, you'd probably want to create a different folder for each of your clients. My Articles folder has subfolders for different issues of *PC World*, with folders inside each for particular articles. I also have separate subfolders for my financial data, my calendar program's files, and of course the ever-popular Miscellaneous.

After you've set up your subfolders, find all your documents, worksheets, address books, and drawings in whatever folders they've been hiding in and drag them to the appropriate subfolders. Don't sweat getting this organization right the first time. You can always redo it. Reorganizing your data subfolders is about a 5-minute job.

3 Tell applications to save files to your new folder. If you used My Documents (or whatever you've chosen to call it) as your master data folder, then Word, Excel, and other Office applications will automatically store files there. But other programs—even other Microsoft applications—don't know about My Documents, so you'll have to tell them about it.



Partition Your Disk

IF YOU HAVE an older PC with a 1GB-plus hard drive, you may be wasting a lot of disk space. Partitioning the drive may let you reclaim a little space, as well as create safe havens for your data or software.

Why partition? Hard drive space is allocated in clusters, the smallest units that Windows can recognize. The FAT16 (File Allocation Table) system used by most Windows PCs can handle a maximum of only 65,536 clusters, which means a 1GB drive has a cluster size of 32K. In other words, even a 180-byte Shortcut file takes up 32K of space.

Most Windows 95 systems shipped this year use FAT32, which can handle more than 4 billion clusters; with FAT32, that same 1GB drive would have a cluster size of only 4K. To find out if your drive is using FAT32, open up *My Computer*, right-click your C: drive, and select *Properties;* on the General tab, the Type will say FAT32. Sorry, but if you want to update an older PC to FAT32 you'll have to wait for Windows 98, due out early next year.

To trim the cluster size on a FAT16 system, you'll need to divide your large hard disk into several smaller drives. If you turn a 1.6GB disk into a 500MB drive C:, a 900MB drive D:, and a 200MB drive E:, the clusters on those logical drives will be 8K, 16K, and 4K, respectively. (See "Wasted Space" for the cluster size of different-size partitions.)

How to do it. If you've got a

Windows 95 offers an easy way to tell most programs where to store data files. But first you'll need to find the application's Shortcut. If you typically launch the program from Windows' Start menu, right-click the *Start* button, select *Open* or *Explore*, and navigate your way to the menu folder containing the Shortcut. Right-click the Shortcut, select *Properties*, click the *Shortcut* tab, and in the 'Start in' field enter the path to your folder—for instance, **c:\1data**. Click *OK*.

If that doesn't work, you'll need to change the program's internal settings for where it stores documents. For instance, with Lotus Word Pro 97, select *File•User Setup•Word Pro Preferences*, click the *Locations* tab, and in the Documents field enter the path to your data folder.

4 Create a Shortcut to your data folder. From an Explorer window, right-click and drag the folder to your desktop. When you drop it, select *Create Shortcut(s) Here*. Double-clicking the folder will open it up in a window. Right-clicking it and selecting *Explore* will open it up in Explorer. You can do the same thing with subfolders. To go to a particular project quickly, create Shortcuts to folders within 1data.

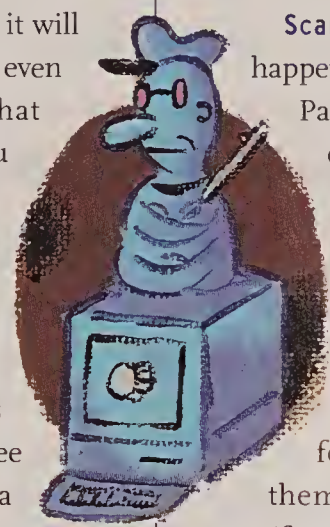
WASTED SPACE

EVERY FILE, no matter how small, consumes at least one hard disk cluster. Larger partitions require larger clusters, which means each file wastes more space. Here are cluster sizes for partitions on a drive formatted with FAT16, the file system used by most Windows 95 PCs.

PARTITION SIZE	CLUSTER SIZE
16MB to 127MB	2K
128MB to 255MB	4K
256MB to 511MB	8K
512MB to 1023MB	16K
1024MB to 2047MB	32K

Protect Your Assets

YOUR HARD DRIVE can be as organized as Martha Stewart's sock drawer, but if you don't maintain it properly, it will still slow to a crawl and perhaps even corrupt your files. To keep that drive running smoothly, you need to regularly defragment the files on it and check the drive itself for errors.



Defrag your files. When Windows stores files, it breaks them into pieces and squirrels them away wherever it finds free space on your drive. This is a more efficient way to store files, but if your disk gets too fragmented, it can really slow down your machine. Even worse, a repair program will have a hard time reconstructing damaged files if the drive is fragmented.

The solution: Defrag your disk every couple of weeks. Windows 95 comes with a serviceable if unspectacular defragmenting utility. From the Start menu, select *Programs•Accessories•System Tools•Disk Defragmenter*. Better defraggers are available in commercial utilities packages (see "The Complete PC Toolbox").

HOT TIP Ignore the "quick defrag" options and pick your defragger's slowest, most complete mode. It takes longer, but you don't have to sit and watch it. Start it when you quit for the night, and it will be done before you return in the morning.

Scan your disk. Bad things can happen to even the best hard drives. Parts of long file names can be orphaned if you use 16-bit applications. The operating system can lose track of files, and wear and tear can render sections of the drive unfit for holding data. A good scanning utility checks for these errors and corrects them. Windows 95 comes with one (from the Start menu, select *Programs•Accessories•System Tools•ScanDisk*), but it's slow and incomplete. You're better off using the scan tool that comes with Norton Utilities or Nuts & Bolts.

HOT TIP Do a quick scan—one without a sector-by-sector check of the drive's surface—every day. But every couple of weeks or so, you should do a more time-consuming full scan of all drive partitions. ▶

new hard drive that contains no data, you can partition it using DOS's fdisk utility. But fdisk wipes out existing data, so if you're already working with your drive, use PowerQuest's PartitionMagic instead—it creates and modifies partitions without destroying any of your data. Partition Magic isn't always intuitive, but it's safer than any alternative I've seen.

When I tried out the lone competing product, Quarterdeck's Partition-It, it conflicted with Western Digital's EZ Drive utility, rendering my drive inaccessible. If I hadn't kept backups, I might still be trying to re-create my lost data. (Quarterdeck is aware of the conflict with EZ Drive but had no solution for it at press time.)

If you do partition, leave room to grow. For instance, if you put Windows in one partition, your apps in another, and your data in a third, leave enough room on the apps partition to install new software.

• **Partition-It** $50 street; Quarterdeck Corp.; 800/683-6696; www.quarterdeck.com

READER SERVICE NO. 747

• **PartitionMagic 3.0** $70 street; PowerQuest Corp.; 801/226-8977, 801/226-8941 (fax); magic@powerquest.com, www.powerquest.com

READER SERVICE NO. 748

TEXT SUPPORT

GOOD HELP is hard to find—especially when choosing a PC reference manual. Here's how to judge a book by more than its cover:

1 Scan the shelves. Go to a store's computer section and choose three books aimed at your general level of expertise.

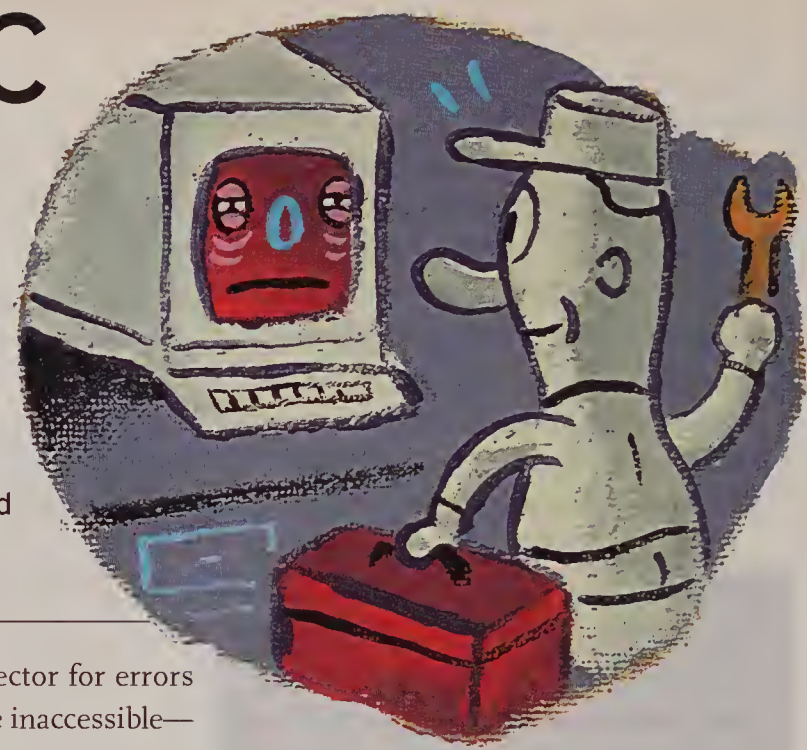
2 Check the index. Pick three topics and see if they're listed in each book's index. (For example: How do I resolve an IRQ conflict? How do I make an emergency recovery disk? Just what is FAT32 and how does it affect hard drive partitions?)

3 Rate the information. Once you find the answers, see if you understand them. Look for step-by-step instructions and illustrations or photos. If you find yourself scratching your head, move on to the next book.

My favorite PC reference books: *The PC Bible* by Eric Knorr (Peachpit Press, 1996, 800/283-9444, $29.95) and *The PC Upgrade and Repair Bible* by Barry Press (IDG Books, 1997, 800/762-2974, $49.99). *The PC Bible* is excellent for basic troubleshooting issues, while *PC Upgrade* is best for do-it-yourselfers and comes with a CD-ROM full of software. —Michael S. Lasky

The Complete PC Toolbox

AS ANYONE with a garage workshop knows, free tools are generally worth what you pay for them. So it is with ScanDisk, Disk Defragmenter, the Recycle Bin, and many of the other utilities that come with Windows 95. To keep your PC in prime shape, you'll want to invest in some first-class diagnostic and repair utilities. Here are my picks for the best of the bunch.



The Essential Utility Library

THE FIRST PACKAGE you need is an all-around collection of solid utilities. There are two top-flight candidates for this job: Symantec's long-established Norton Utilities and Helix's newcomer Nuts & Bolts. What separates them? About $30, with Nuts & Bolts being the cheaper of the two. Helix's package also sports a better user interface, with clear dialog boxes and excellent tools (see "Checking Out the Libraries"). If you already own Norton there's no reason to abandon it (I'm a Norton user from way back and I still use it), but Nuts & Bolts is the better buy.

NUTS & BOLTS' centralized user interface helps make it easier to use than Norton Utilities.

Both packages test and fix your hard drive more thoroughly than does Windows' ScanDisk. For instance, they check the partition table and the boot sector for errors that can render your drive inaccessible—things that ScanDisk ignores.

Symantec's and Helix's defraggers are also faster and considerably safer because to avoid errors they compare the file fragments to the originals as they move them. They even defrag Windows' swap file—the chunk of hard drive space that Windows uses when it needs more RAM (in other words, all the time).

They're also true 32-bit programs, while ScanDisk and Disk Defragmenter are old-fashioned, 16-bit tools. A 16-bit program is more prone to crashing, and if there's anything you don't want to crash, it's a disk scanner or defragger.

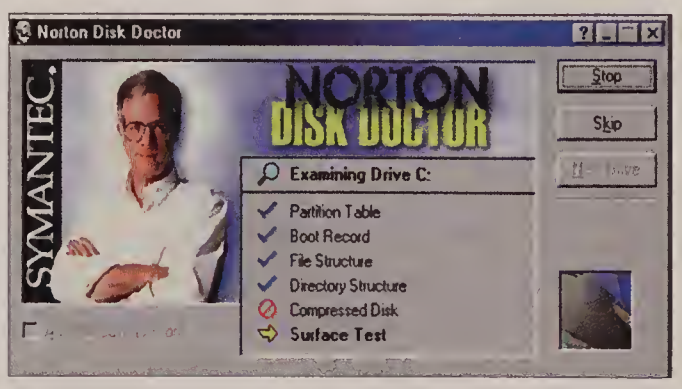
HOT TIP You can have Norton or Nuts & Bolts run in the background, alerting you if your hard drive needs defragging or if any files are cross-linked. My advice: Don't bother. Just remember to defrag or scan the drive every couple of weeks.

- **Norton Utilities 2.0 for Windows 95** $79 street, **Norton AntiVirus** $69 street; Symantec; 800/441-7234; www.symantec.com

READER SERVICE NO. 749

- **Nuts & Bolts** $50 street; Helix Software; 800/451-0551; www.helixsoftware.com

READER SERVICE NO. 750



NORTON DISK DOCTOR gives your hard drive a checkup under the watchful eye of product creator Peter Norton.

CHECKING OUT THE Libraries

Nuts & Bolts offers more for your money, but if you already use Norton, you may not want to switch.

	Norton Utilities	Nuts & Bolts
Street price	$79	$50
Disk scanner		
Checks FAT	●	●
Looks for cross-linked files	●	●
Checks long file names	●	●
Checks boot sector	●	●
Tests CMOS	●	●
Scans disk surface	●	●
Other care and protection		
Disk defragmenter	●	●
Enhanced Recycle Bin	●	●
Monitors system in background	●	●
Makes emergency floppy	●	●
System information	●	●
Crash protection	●	●
Hardware diagnostics	●[1]	●
Automatic updater	●	○
File management		
Cleans drive of unneeded files	●	●
Cleans drive of orphaned Shortcuts	○	●
File compression	○	●
File comparison	●	○
File encryption and decryption	○	●

● = Yes ○ = No

[1] Hardware diagnostics program runs in a DOS window.

The Latest, Greatest Software

APPLICATIONS seem to change by the minute. By the time you install one, there's either a new version or a new patch for the current version. In fact, Windows 98, due out early next year, is expected to come with its own Internet update software. Meanwhile, several software solutions can keep you and your applications up-to-date, but they're not for everyone.

CyberMedia's **Oil Change** scans the Internet and offers you a list of updates to the programs it finds on your system. After you download the update, Oil Change can unpack the compressed file and will even run the install program for you. It also has an undo feature that can (or at least should) uninstall the most recent update you made through it.

Using Oil Change showed me just how out-of-date my programs really were. I found I could install a file conversion wizard for Excel, add a preview pane to Exchange, and install a QuickTime plug-in in Netscape Navigator.

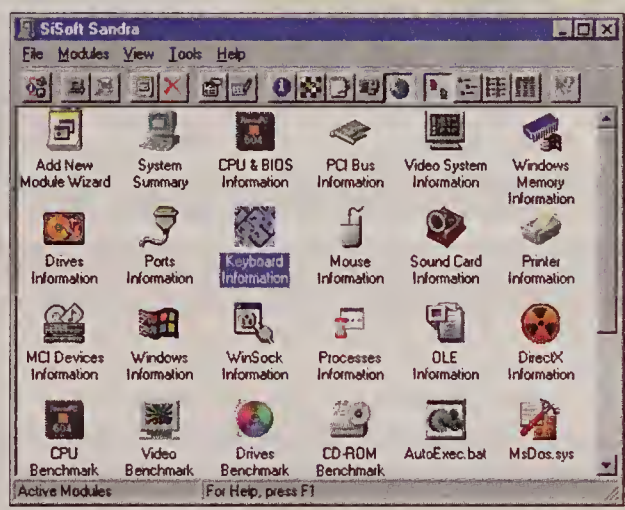
But Oil Change didn't tell me to update Norton AntiVirus, even though I knew that I needed to. Stranger than that, it recommended upgrades to several games I'd never even heard of, and suggested I upgrade America Online from version 2.5 to 3.0 (which I was already using). And when I tried to uninstall Word 97's file compatibility patch, it didn't work. (An upgrade to Oil Change, which features push technology, an expanded knowledgebase, and the ability to schedule nighttime updates, was unavailable for testing at press time. It should be available by the time you read this.)

TuneUp.com (www.tuneup.com) is a Web-based subscription service that can keep your system up-to-date for $3.95 a month. It costs more than Oil Change but includes virus checking, information from a number of sources (including BugNet), and one-on-one technical support by e-mail. Earlier this year Quarterdeck purchased TuneUp.com; a retail version of the Web-based tool, **PCTuneUp**, should be on store shelves by the time you read this. PCTuneUp will also be able to roll back installations, so that if installing the latest Blunderbuss driver renders your laser printer inoperable, you can go back to the driver you were using before.

If you use a lot of shareware, Manageable Software Services offers a free ▶

TERRIFIC Shareware EXTRAS

THERE ARE SOME wonderful little programs that can make it much easier to care for your PC. Better yet, many are no-cost or inexpensive shareware products you can evaluate free of charge. All the programs discussed here are available at www.pcworld.com/files.



IT LOOKS LIKE WINDOWS' Control Panel, but it's really SiSoft Sandra, an inexpensive (and in some cases free) diagnostic program.

Safety Net Pro. Want a quick way to back up your Windows configuration files? Safety Net Pro copies your Registry, .ini files, and other important settings to floppy disk. If disaster strikes, you can restore your custom Windows 95 settings, even if your backup drive doesn't work. $21.95 registration fee; CT Software; 800/617-7740; members.aol.com/ron2222.

RegClean. Windows 95's Registry is like your garage; it stores stuff you don't know what to do with but don't dare throw away. RegClean clears away some of the mess. The program often misses more garbage than it finds, but you can't complain about the price—it's free. See www.microsoft.com/kb/articles/q147/7/69.htm for details.

SiSoft Sandra. Ever wonder how Windows is using all that RAM? Run SiSoft Sandra, a near-complete diagnostic tool with an interface that looks a lot like Windows' Control Panel, to find out. Registration fees vary (the program is free to homes and schools). SiSoft Software Ltd.; C.A.Silasi@city.ac.uk, www.city.ac.uk/~ax515/sandra.html.

Windows 95 Registry FAQ. Designed for moderately technical to advanced users, the FAQ has everything from tips on changing icons to a reference list of binary values. You can even launch Windows' Registry Editor and configuration backup program from the FAQ. A more ambitious shareware version, with information on Microsoft Office, Internet Explorer, and other products, is in the works. Imaginations Unlimited; registryFAQ@imaginations.com, www.imaginations.com.

DiskData. As I write this, my C: drive has 853,478K of actual files, which, thanks to its 16K clusters, is taking up 1,003,248K of disk space. Meanwhile, my Start menu folder has 253K of small Shortcut files that take up 6864K. This info is at my fingertips thanks to DiskData, a handy little program that shows where your hard drive space is going. Informative, easy to use, and free. Can't ask for more than that. Digital Information Gallery; www.digallery.com/diskdata.

ConfigSafe. Want to take a snapshot of your Windows configuration files? Use Artisoft's ConfigSafe. Then, when disaster strikes and Word tells you a .dll file is missing (when it really isn't), you can restore the snapshot and everything should start working again. Even if Windows refuses to load, the program can restore your system from a DOS prompt. The $40 program isn't shareware, but I wish I'd discovered it before I started writing this article. Artisoft; 800/846-9726; www.artisoft.com.

READER SERVICE NO. 751

—Lincoln Spector

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Common features: ◆ Mini Tower Model ◆ 512KB L2 Cache ◆ 24X Max[§] Variable CD-ROM Drive ◆ Microsoft® Office 97 Small Business Edition plus Bookshelf 96 ◆ Microsoft Windows 95 ◆ Microsoft Mouse (MS IntelliMouse on XPS Systems) ◆ 2 Universal Serial Bus (USB) Ports ◆ 3 Year Limited Warranty[†] with 1 Year On-site[Δ] Service ◆
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Upgrades: ◆ Iomega Zip 100MB IDE Internal Drive w/One Cartridge, add $99. ◆ 3-Pak of Zip 100MB Cartridges, add $33. ◆ HP DeskJet 820Cse Color Printer, add $299.

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Common features listed above plus:
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- *NEW* 8.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms)
- 1200HS Monitor (17.9" v.i.s., .26dp)
- *NEW* Matrox Millennium II 8MB WRAM Video Card^
- AWE64 Value Sound Card
- Altec Lansing ACS-490 Full Dolby Surround Sound Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive with One Cartridge

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- *NEW* Matrox Millennium II 8MB WRAM Video Card^
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-290 Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive with One Cartridge

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- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Velocity 4MB AGP Video Card*
- Integrated Yamaha Wavetable Sound
- Altec Lansing ACS-90 Speakers

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- 1000LS Monitor (15.9" v.i.s.)
- *NEW* STB Nitro 4MB EDO PCI Video Card
- Sound Blaster 16 WaveSynth Wavetable Sound
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★ *Upgrade to 6.4GB Ultra ATA Hard Drive with 512KB Cache (9.5ms), add $79.*

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***Product, as configured, will ship by October 20. Please call for updated shipment information.**

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‡Pricing is not discountable. †For a complete copy of our Guarantees or Limited Warranties, please write Dell USA L.P. Attn: Warranty, One Dell Way, Round Rock, TX 78682. ◊Leasing arranged by third-party leasing companies to qualified customers. *System weight with floppy drive or CD-ROM in options bay. Δ On-site service provided by an independent third-party provider. May not be available in certain remote areas. § 20X Max./11X Min. Ω 12X Max./8X Min. ¥ 24 Max./12X Min. **x2 products are capable of 56Kbps downloads. Due to FCC rules that restrict power output, however, current download speeds are limited to 53Kbps. Upload speeds are limited to 33.6 Kbps. Actual speeds may vary depending on line conditions. ††Advertised configuration varies from tested configuration. ^4MB Baseboard with a 4MB Upgrade Module. *Prices and specifications valid in the U.S. only and subject to change without notice. Intel, the Intel Inside logo, LANDesk and Pentium are registered trademarks and MMX and EtherExpress are trademarks of Intel Corporation. MS, Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. 3Com and EtherLink are registered trademarks of 3Com Corporation. Trinitron is a registered trademark of Sony Corporation. DirectLine is a service mark of Dell Computer Corporation. ©1997 Dell Computer Corporation. All rights reserved.

◊Amount of monthly lease payment, based on 24-month lease from Dell Financial Services L.P., an independent entity; amount due prior to delivery: Ø$338; Σ$268; ∞$214; π$178 (amounts exclude taxes which may vary; for example, Hartford City, IN fees Ø$8.45); no security deposit required, subject to credit approval and availability. Lease terms subject to change.

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★ *Upgrade to 32MB SDRAM, add $99.*
★ *Sound Blaster 16 PnP and Altec Lansing ACS-90 Speakers, add $89.*

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Common features listed above plus:
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★ *Leather Carrying Case, add $99.*
★ *3Com Lan+ 33.6 Modem PC Card, add $299.*
★ *Dell Latitude LM Port Replicator, add $159.*

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166MHz PENTIUM PROCESSOR W/MMX

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- 40MB EDO RAM (72MB Max)
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★ *2nd Lithium Ion Battery, add $199.*
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Business Lease: $123/Mo.
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166MHz PENTIUM PROCESSOR W/MMX

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- 16MB EDO RAM (72MB Max)
- 1.6GB Hard Drive
- MS Office 97 Small Business Edition

★ *Upgrade to 40MB EDO RAM, add $299.*
★ *Upgrade to a 2.1GB Hard Drive, add $149.*
★ *2nd Lithium Ion Battery, add $199.*
★ *NEW 56K Capable** x2 Modem, add $149.*
★ *Dell Latitude LM Port Replicator, add $159.*

$2899‡

Business Lease: $105/Mo.
Order Code #800140

***NEW* DELL LATITUDE LM M133ST**
133MHz PENTIUM PROCESSOR W/MMX

Common features listed above plus:
- 12.1" SVGA Active Matrix Display
- 16MB EDO RAM (72MB Max)
- 1.6GB Hard Drive
- MS Office 97 Small Business Edition

★ *Upgrade to 24MB EDO RAM, add $99.*
★ *Upgrade to a 2.1GB Hard Drive, add $149.*
★ *2nd Lithium Ion Battery, add $199.*
★ *Nylon Carrying Case, add $69.*
★ *Dell Latitude LM Port Replicator, add $159.*
★ *3Com 10Base-T Network Card, add $129.*

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update service called **Catch-Up.** Catch-Up doesn't automate the upgrade process and won't update a program you bought in a store, but it does make it easy to check up on and download shareware and freeware programs. If you're using a lot of shareware, it's convenient—at least until you're overwhelmed by all the .zip files and installation programs you find yourself downloading.

If you use a great many programs, automatic update packages are worth your while: Maintaining the latest versions of your core applications should help you avoid bugs and keep your computer running smoothly. But if there are only two or three programs you need to update on a regular basis, these utilities probably aren't worth your time or money.

- **Catch-Up** free; Manage-able Software Services; www.manageable.com
- **Oil Change** first-year subscription $39.95, subsequent years $19.95 each; CyberMedia; 310/581-4700; www.cybermedia.com

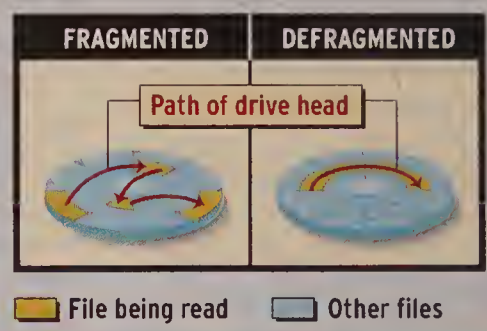
READER SERVICE NO. 752

- **PCTuneUp** $40 street (includes one-year subscription; renewal rates were not yet set at press time); Quarterdeck Corp.; 310/309-3700; www.quarterdeck.com

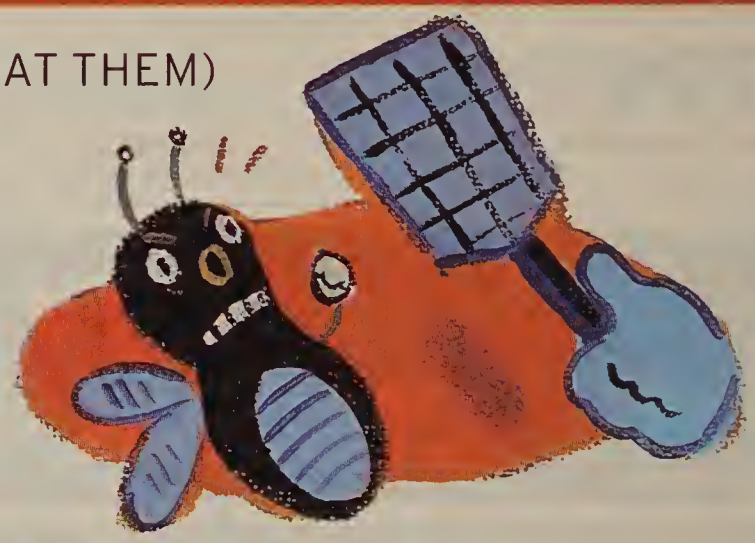
READER SERVICE NO. 753

DEFRAG YOUR DRIVE

BECAUSE IF YOU DON'T, your drive's read/write head will skip around the disk to pick up stray pieces of a file—slowing down your PC.



Top Ten Bugs (AND HOW TO SWAT THEM)



1 Netscape Navigator

BUG: Security flaws in Navigator 3.0 and 4.0 can allow hackers to access files on your PC.

FIX: Download Navigator version 3.03 or Communicator version 4.02 from Netscape's Software Download Page (home.netscape.com/comprod/mirror/client_download.html).

2 Internet Explorer

BUG: Potentially dangerous security holes in Explorer 3.0 could let evil Web page authors attack your hard disk.

FIX: Download Internet Explorer 3.02 from www.microsoft.com/msdownload/ieplatform/iewin95/iewin95.asp.

3 Windows 95

BUG: File system problems could endanger your data; also has poor password security.

FIX: Windows 95 Service Pack 1 (found at www.microsoft.com/windows95/info/service-packs.htm) beefs up security but includes a bug of its own that can nuke its ability to save your log-in password. You can get around this bug by deleting your password list file (use *File•Find* and look for and then delete ***.pwl**), and then grabbing the patch from www.microsoft.com/windows/software/passwd.htm.

4 Microsoft Fax

BUG: You can't use the cover pages in Win 95's Exchange fax program, even though the files are in the Windows directory.

FIX: Don't bother figuring it out; just download the patch from www.microsoft.com/windows/software/coverpg.htm.

5 Quicken

BUG: Quicken's 6.0b update fixed some bugs and introduced a new one: It won't automatically move scheduled transactions from the Reminders window to the register.

FIX: At press time Intuit was still working on a patch. However, you'll find lengthy work-around instructions at www.intuit.com/quicken/technical-support/quicken/releases/qfw6-releases.

6 Cyrix 6x86 CPU

BUG: Early versions of the CPU run slowly under Windows NT. Some programs (particularly games) that require a Pentium may refuse to run.

FIX: Cyrix has an exchange program for NT users with early CPUs (call 800/462-9749). Check out Bryan Davis's 6x86 Web site (www.alternativecpu.com) for links to utilities that fool Win 95 into detecting the 6x86 chip as an Intel Pentium.

7 Microsoft Office 97

BUG: Office 97 data files are often incompatible with those from earlier versions of Office.

FIX: The 8MB Service Release (www.microsoft.com/Office/Office97/ServiceRelease) bears fixes, enhancements, and file converters. Watch out, though—versions downloaded in early August were buggy.

8 Norton Utilities 2.0

BUG: Version 2.0 trips over earlier installations, displays the amount of free disk space incorrectly, leaks memory, and does not completely support FAT32 disk partitions.

FIX: Use Norton's LiveUpdate feature to grab version 2.03, or else download it from service.symantec.com/ftp/nutilftp.html.

9 Tax Software

BUG: Tax software bugs seldom bite hard, but you should always check for fixes before entering data and printing your forms.

FIX: For TurboTax, scout out www.intuit.com/turbotax/. For Block Financial's Kiplinger TaxCut, review www.conductor.com/software/techsupp.htm.

10 Iomega Jaz Disks

BUG: A limited number of Jaz disks manufactured between March 13 and April 20, 1997, are defective and will eventually suffer from performance degradation or fail completely.

FIX: If you have a bad disk, Iomega's customer service department (800/336-1314) will replace it for free. For a complete description of the problem, including how to identify defective disks (the date of manufacture is etched on each), and how to exchange them, read the company's press release about the problem at www.iomega.com/company/news/newsjaz/jazdisk.html. —Scott Spanbauer

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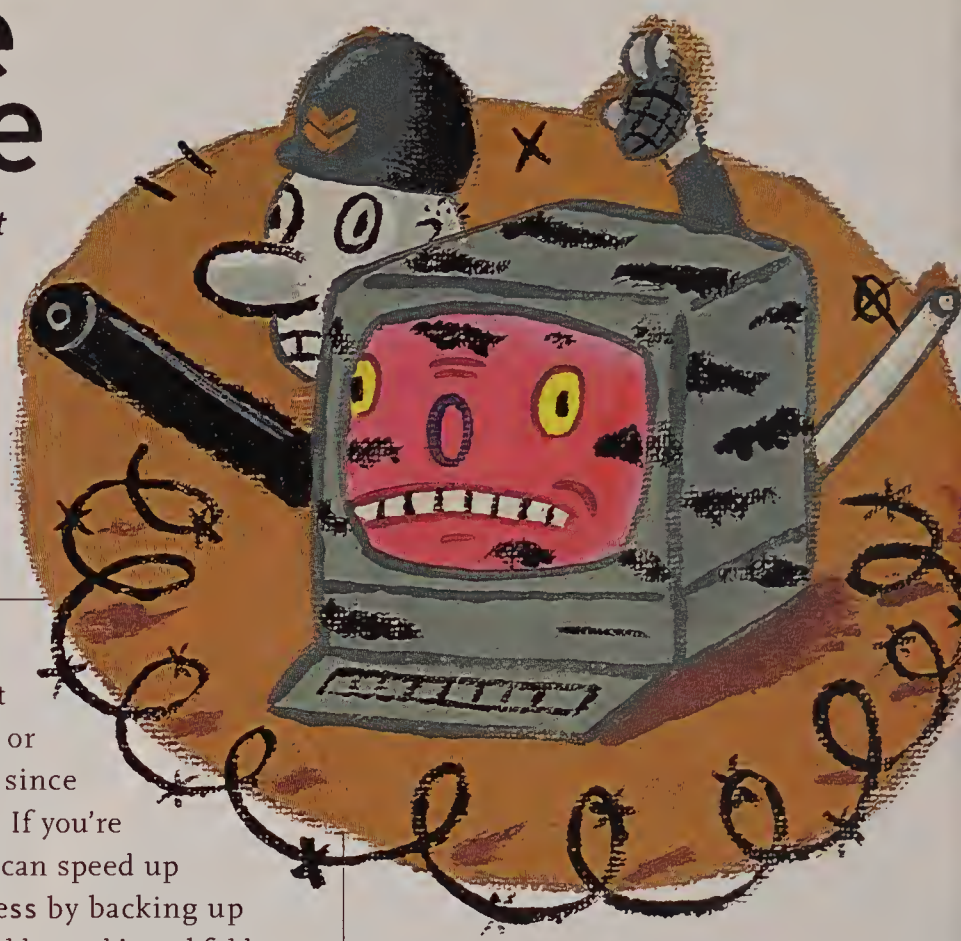
CALL ME PARANOID, but I believe you should *expect* disaster to strike. If you don't back up your files, monitor viruses, and protect against power dips and surges, you could lose it all. Here are three absolute essentials (and one optional step) that will preserve your data—and maybe your sanity.



ESSENTIAL #1

A Backup Drive

THE MOST IMPORTANT thing you can do to protect your data is to back it up regularly and reliably. Believe me, I know. While working on this article, I managed to render my hard drive completely inaccessible. Fortunately, I had a recent—and complete—backup on tape. Within a couple of hours, I was back to work.

Here are the steps for backup security:

1 Get a tape drive. The easiest backup in the world is one where you click a button and walk away. The cheapest way to do this is to buy a tape backup device with at least the capacity of your hard drive, such as the Iomega Ditto 2GB or the Ditto Easy 3200. (See "Better Safe Than Sorry," February 1997.) Removable-disk units like Iomega's Zip drive just aren't big enough. And don't even think about floppies.

Internal backup drives are $40 to $150 cheaper than external drives but require you to pop the hood and install them; most external drives are slower but simply plug into your PC's parallel port.

2 Test it. Sometimes a tape drive seems to be working fine. Then you try to restore a file (usually the day your big project is due) and realize the drive only *looks* like it's been backing up your files. To protect yourself, back up and restore a few files when you set up the drive's software. You should run this test about once a month.

3 Set up a schedule. Once you've tested the tape drive, do a full backup. Then at the end of every workday, do an incremental backup, which copies only those files that were created or have changed since the last backup. If you're in a hurry, you can speed up this daily process by backing up only your data folder and its subfolders.

Every two weeks, change tapes and do another full backup. With two or three tapes, you'll have a month's worth of data.

4 Store your data off-site. If your computer is stolen or destroyed in a fire, you don't want your data to go with it. Store your backup tapes in a secure place, like a safe-deposit box or a fireproof safe.

HOT TIP For the ultimate in off-site data storage, check out Web-based online backup options, like McAfee's Personal Vault (www.mcafee.com/prod/stormgt/mpv.html) and Atrieva Corporation's Atrieva (www.atrieva.com). With online backup there's no need to buy a backup drive, and no worrying about fire, theft, or flooding. Costs vary, but storage starts at around $10 a month for 25MB of server space. The drawbacks? Using an online backup service can be slow and expensive, depending on how much data you store. You're also dependent on the service's server being accessible at all times. ▶

Free SUPPORT: USENET TO THE RESCUE

IF YOU'RE WILLING to forgo pure quality in favor of sheer quantity, you can get great advice from Usenet newsgroups. Here are some of the sharpest groups around:

alt.comp.shareware: This low-volume group provides a manageable introduction to Net news.

alt.comp.virus: Get the virus and antivirus software skinny from *A* to *Z*. Beware of occasional obscene spam.

alt.sys.pc-clone.dell: Commune with other disgruntled, or gruntled, Dell PC users. See also alt.sys.pc-clone.gateway2000 and alt.sys.pc-clone.micron.

comp.dcom.modems: More than you ever wanted to know about modems, phone lines, and the human urge to communicate. Also don't miss comp.dcom.fax and comp.dcom.isdn.

comp.infosystems.www.browsers.ms-windows: The latest scuttlebutt on beta bugs, push and pull technologies, and Java and JScript. Warning: This is a high-volume group.

comp.os.ms-windows.win95.misc: The mother of all Windows 95 information resources. NT users should visit comp.os.ms-windows.nt instead; Windows 3.*x* is still being rehashed in comp.os.ms-windows.misc.

comp.sys.ibm.pc.hardware.*: Eight different groups cover topics including processors, computer systems, communications, networking, storage, CD-ROM drives, and video boards. If it's not discussed here, it's just not hardware. —Scott Spanbauer

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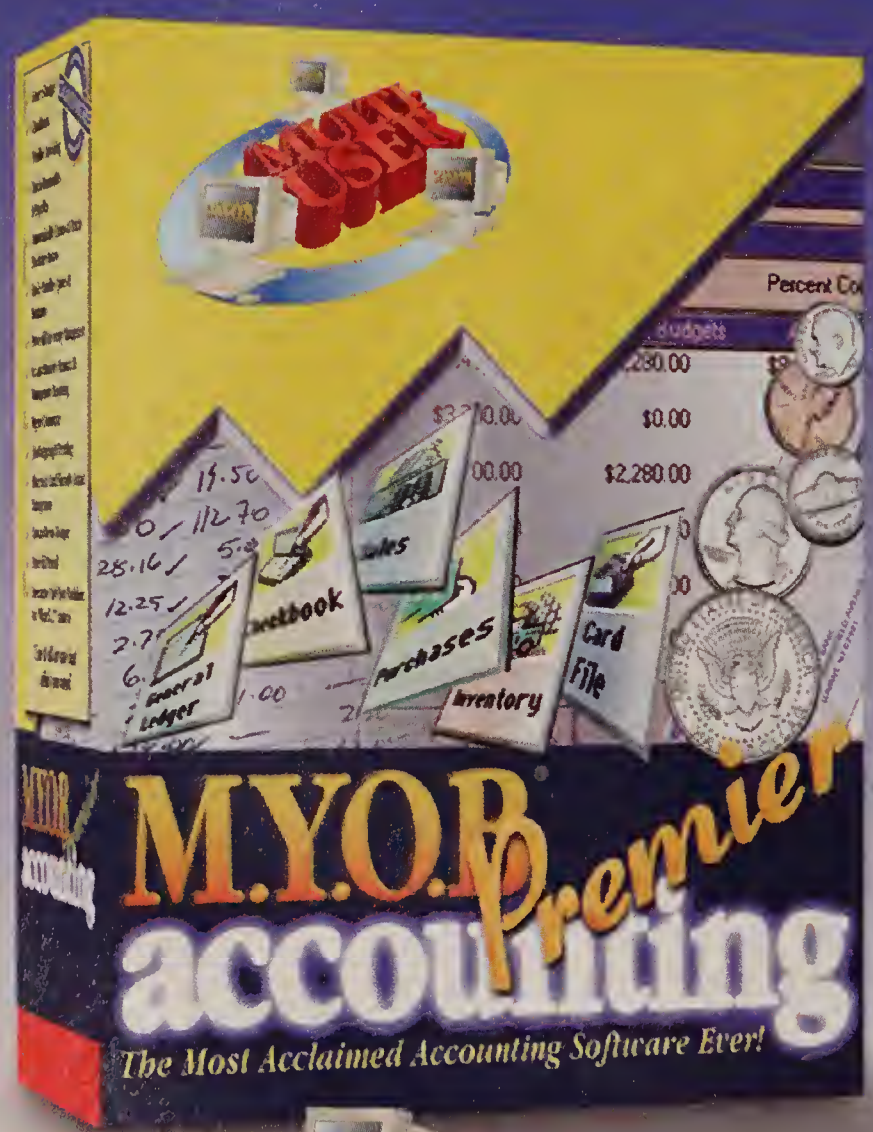
What's the Difference Between High End and Entry Level Accounting Software?



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PC MAGAZINE JULY 1997

SERVICE AND RELIABILITY SURVEY

When it comes to service and reliability, who's the one notebook maker you can truly count on? According to the nearly 8,500 people who responded to *PC Magazine*'s 10th Annual Service and Reliability Survey, there is only one. (Impressive considering they rated some 3,800 notebooks from 15 vendors, isn't it?) How did we earn the only "A"? Over the last year, our users reported better than average scores on four key measures: satisfaction with reliability, repair experience, and technical support; and the need for recent repairs. They also said they'd buy one again. To say the same for your notebook, visit us on the Web or give us a call.

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ESSENTIAL #2

Antivirus Software

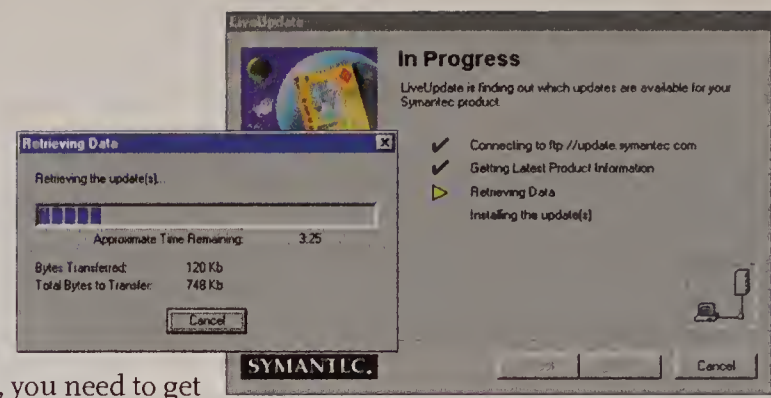
EVERY PARENT KNOWS that when the little ones go off to preschool, they're bound to come home with the flu. The same is true of the Internet. As soon as you're sharing data and programs with millions of users online, your computer's chances of coming down with a virus increase a hundredfold. You need an up-to-date antivirus package, and you need to use it correctly. Here's how:

1 Buy an antivirus program. Look for one that operates in the background, checking files as you work. It should be easy to set up, use, and—very important—update. When *PC World* last reviewed antivirus software (see "Virus Killers: The Best Software for Protecting Your PC," March 1997), Dr Solomon's Anti-Virus Toolkit was awarded the Best Buy by virtue of its ability to detect all the viruses we threw at it and remove 89 percent of them. I use Symantec's Norton AntiVirus, which also detected all the viruses but was able to remove only 77 percent of them. I like it because it's simple to use, versatile, and amazingly easy to update—you just click a button and it updates itself over the Net.

2 Run it in the background. This is the best way to use an antivirus program because it stays out of your way. You can also scan your drive for viruses daily or weekly, but thanks to the vigilance of what these programs do in the background, that isn't really necessary.

3 Update virus definitions at least monthly. New viruses are cropping up all the time. If you want to stay clear of them, you need to get regular updates from the folks who made your software. Most antivirus programs allow you to download new definitions off their Web sites—or better yet, through one-button, Net-based updating tools built into the programs themselves.

HOT TIP Scan your hard drive after updating your program's virus definitions. That way, you can make sure that the software hadn't been missing a newly discovered virus before you updated it.



NORTON ANTIVIRUS'S LiveUpdate provides the latest word on newly hatched viruses.

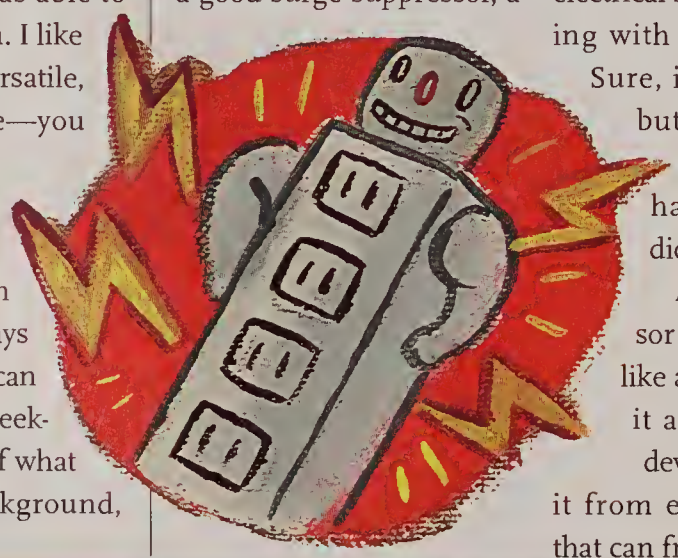
• **Dr Solomon's Anti-Virus Toolkit** $85 street, **Dr Solomon's Anti-Virus** $50 street; Dr Solomon's Software; 800/960-9095; www.drsolomon.com

READER SERVICE NO. 754

ESSENTIAL #3

A Surge Suppressor

POWER CORRUPTS, and electric power corrupts electrically. If you don't use a good surge suppressor, a sudden jolt of electricity can wipe out your computer. This is especially true if you live in an area with frequent electrical storms or a building with ancient wiring. Sure, it's a small risk, but do you want to bet all of your hard work on it? I didn't think so.



A surge suppressor looks and works like a power strip, but it also protects the devices plugged into it from electrical surges that can fry your hardware. If the surge suppressor is hit by a bigger jolt than it can handle, it will self-destruct, shutting off power to your computer and sacrificing itself for the good of more expensive hardware. Best of all, you can find a decent one for under $20.

HOT TIP Buy a surge suppressor with a UL 1449 rating of 330 volts or less and 240 or more joules. A unit with four to six outlets is probably sufficient. If you live in an area with a lot of electrical storms, get a surge suppressor with phone jacks for protection from surges coming through the phone line and into your modem.

AND THE OPTIONAL

An Uninterruptible Power Supply

IF YOUR WORK is so critical and time-sensitive that a sudden system crash would be an absolute disaster, get yourself an uninterruptible power supply. This is basically a battery with a surge suppressor attached. If a power failure occurs, you'll get enough juice to save your work and close things down gracefully.

For most people, the advantages of a UPS just aren't worth the device's $100 to $500 price. You can protect your work for free by saving to disk often—and far more crashes are caused by bad software than by a loss of power. I've never owned a UPS.

Still, there was that time when the power went out at the *PC World* office. While the rest of us screamed and cursed, the one editor with a UPS happily finished the paragraph he was writing, saved the document, exited Windows, and properly shut off his machine.

online *Find files from this article at www.pcworld.com/files. Lincoln Spector is a contributing editor and Michael S. Lasky and Scott Spanbauer are senior associate editors for* PC World.

For more information about all products in this article, circle reader service no. 911.

Your PC Tune-Up Schedule

THINGS TO DO

Every Day

Scan your disk quickly Use Norton Utilities' Disk Doctor, Nuts & Bolts' Disk Minder, or Windows' ScanDisk to check for cross-linked files and other problems. For a quicker scan, turn off the surface scan option. Put the program Shortcut in your Startup folder so your disk gets scanned every time you load Windows.

Do an incremental backup At the end of the day, back up only those files that have changed since the last backup. In a hurry? Do an incremental backup of only your data folder and its subfolders.

THINGS TO DO

Every Two Weeks

Back up your entire hard drive A recent, full copy of your hard drive's contents is the best insurance you've got against data-loss disaster. Put in a fresh backup tape, close all running applications, and launch your backup program. Start a full backup, turn off the monitor, and leave the office —preferably for the night.

Defrag your hard drive Set your defragging software (Norton Utilities' Speed Disk, Nuts & Bolts' Disk Tune, or Windows' Disk Defragmenter) to its slowest and most complete setting, get it started, then turn off your monitor and walk away. A long lunch break will probably be enough time. If not, do it overnight.

Scan your drive Use Norton's Disk Doctor, Nuts & Bolts' Disk Minder, or Windows' ScanDisk to check the condition of your hard drive. This time, make sure the surface scan option is turned on.

THINGS TO DO

Every Month

Test your backup Backup drives and tapes aren't always dependable. About once a month, try to restore a few files from various folders—preferably files that are expendable. If you can't restore them, contact the tape drive manufacturer.

Update your virus definitions Your antivirus program vendor regularly posts updates that help the software spot the latest in malevolent engineering. Grab the updates off the vendor's Web site, or use the program's built-in update tool.

THINGS TO DO

When Installing Software

Make room on your hard drive To find out how much room you have on your drive, double-click *My Computer*, right-click the drive, and select *Properties*. You'll want enough space to load the entire program, plus 10 percent of your drive's total space.

If you don't have enough space, empty the Recycle Bin, look for files you can delete or archive, and uninstall applications you no longer use. Both Norton Utilities and Nuts & Bolts have tools that can help you determine which files are unworthy of disk space.

Back up the Registry Installation programs do all sorts of horrible things to user.dat and system.dat, the two huge and complex Registry files where Windows stores your configurations. You can't back up the Registry with Explorer or with DOS's copy command, but there's a program buried on the Windows 95 CD-ROM that lets you do it. Go to the disc's other\misc\cfgback folder, and copy cfgback.exe to your Windows folder and cfgback.hlp to your Windows\Help folder. To make a Registry backup, launch the cfgback.exe program and follow the directions.

Take a snapshot of Windows From a DOS prompt, enter the commands **dir c:\windows > before.dir** and **dir c:\windows\system >> before.dir**; note that the second command uses two greater-than (>) signs. This creates a text file listing all files in those directories—a big help if you decide later to restore your settings.

Do the installation Don't be too quick to go with defaults. Think about which components you need and where on your hard drive you want the program. In most cases, a subfolder in My Programs is the best location.

Take another snapshot This time the DOS commands are **dir c:\windows > after.dir** and **dir c:\windows\system >> after.dir**. Once you've created the before and after files, use a word processor or Norton Utilities' file comparison program to look at the changes.

Tell the new app about your data folder Find out where your new program saves its data files, and change the default to ldata (or whatever you call your data folder). ▶

ILLUSTRATIONS: GARY BASEMAN

THINGS YOU SHOULD

Do Once

Make emergency boot floppies You'll need them for that horrible day when your hard drive refuses to boot. Here are the essential steps:

1 To create your basic Windows 95 emergency boot disk, insert a floppy, go to the Start menu, and select *Settings•Control Panel*. Double-click *Add/Remove Programs*, click the *Startup Disk* tab, and click the *Create Disk* button. The resulting disk will contain a number of DOS-based utilities for examining and fixing your system.

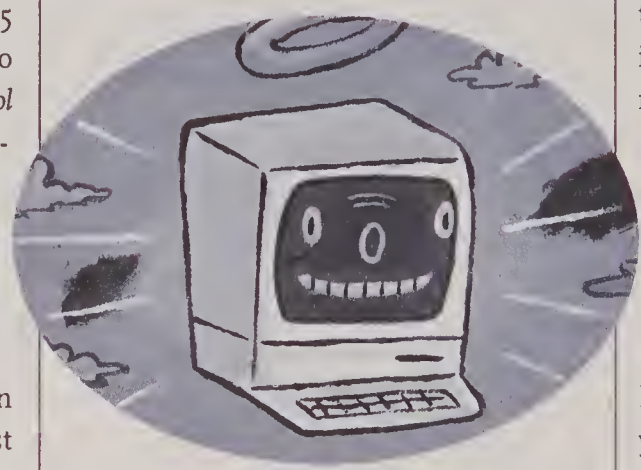
2 Programs like Symantec's Norton Utilities, Helix's Nuts & Bolts, and most major antivirus products create their own emergency boot floppies. If you have one of these programs, simply follow its instructions.

3 In case you ever have to reinstall Windows 95 itself, you'll need an emergency boot disk with your 16-bit CD-ROM drivers on it. If your computer came with Windows 95 already installed, this should be easy. From the Start menu, go to *Programs•Accessories•System Tools* and see if you have an option called *Create System Disks*. If not, try to find your old DOS autoexec.bat and config.sys files and your CD-ROM drivers and then save them on a floppy disk.

4 Write-protect all your boot floppies and store them in a safe place where you can access them easily.

Buy a surge suppressor A sudden surge in electricity can transform your PC into a piece of avant-garde sculpture. Look for one with a UL 1449 rating of 330 volts or less and at least 240 joules; make sure it has enough outlets to meet your needs.

Also worth considering: a suppressor with phone jacks to go between the wall and your modem.



Buy a tape drive Look for a drive with a capacity at least equal to your hard drive's. That way, you can back up your entire system without having to be there to switch tapes.

- External drives that plug into the PC's parallel port are generally easier to install than internal ones, and they can be easily shared between computers.
- Test the tape drive by backing up and restoring some files before trusting it to do a real job.
- See "Better Safe Than Sorry" in the February 1997 issue for more details on the best tape drives for your money.

Buy a good set of utilities For thorough and safe disk scanning and defragging, crash protection, and assorted other forms of protection, you'll want Symantec's Norton Utilities or Helix's Nuts & Bolts. Either program does an excellent job, but Nuts & Bolts gives you more for your money. See "The Complete PC Toolbox" for more details.

You'll also want a full virus protection program—one that can watch your system and check new files, update virus definitions, scan your hard drive, and eliminate existing infections. We recommend Dr Solomon's Anti-Virus Toolkit; see "Virus Killers: The Best Software for Protecting Your PC," March 1997, for more information.

Decide how to partition your hard drive If your hard drive is 1GB or larger and your PC uses the FAT16 file system, it's time to divide the drive. Using a partition program (I like PartitionMagic), make your logical C: drive 1023MB, the largest it can be and still have 16K clusters. Why 16K? Because a 511MB drive—the largest capacity that allows 8K clusters—fills up too quickly with today's software.

On drive C:, put Windows, your data, and as many of your regular programs as will fit. Name the rest of the hard drive D:, and use it to hold apps you don't work with a lot, large disk-hogging programs, and major downloads. If you find yourself keeping a lot of little programs on D: that you don't use often but want to keep, compress them into archives—then you can access them later.

Organize your hard drive You should organize your data in a way that makes sense to you. Here's how:

1 Create a data folder on your hard drive. (If you're using Microsoft Office for Win 95 or later, you've already got one called My Documents.) Rename it **1data** or another name that's meaningful to you.

2 Create subfolders in the data folder to store your work logically by project, client name, or whatever works for you.

3 Move your data into the subfolders.

4 Set your applications to save new files to your data folder by default.

5 Put Shortcuts to your data folder—and possibly to subfolders within your data folder—on your desktop or in the Start menu. —Lincoln Spector ■

THINGS YOU SHOULD

Never Do

1 Never assume that disasters happen only to other people. You'll be sorry.

2 Don't unplug peripherals while your computer is turned on.

3 Don't shut off your PC without properly exiting Windows first. The next time you start Windows, you could be in for a nasty surprise.

4 Don't improve your computer in any major way—like installing RAM or upgrading your operating system—without first doing a thorough backup.

5 Never open a file you've just downloaded unless your antivirus program is up and running in auto-scan mode.

6 Don't store floppies or backup tapes near a magnet, such as in a telephone or monitor or on a refrigerator. It can wipe out their data.

7 Don't smoke near your computer. The smoke is bad for more than just your lungs.

8 Don't use your CD-ROM drive as a coffee cup holder. In fact, it's best not to drink or eat anything near your PC.

9 Don't grab your mouse by the cord and beat it against your computer just because you're frustrated.

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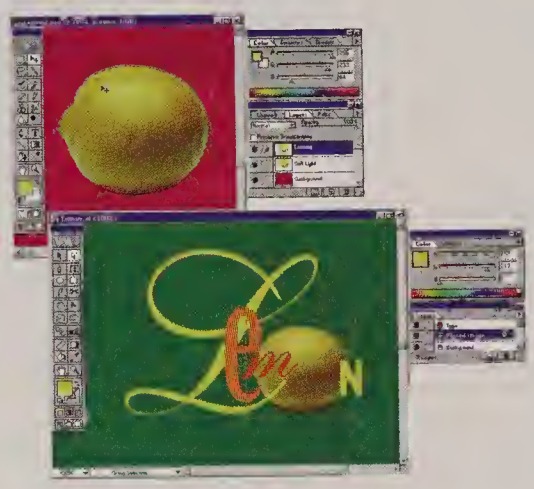

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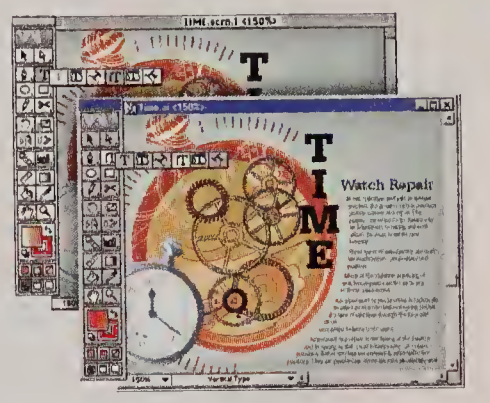

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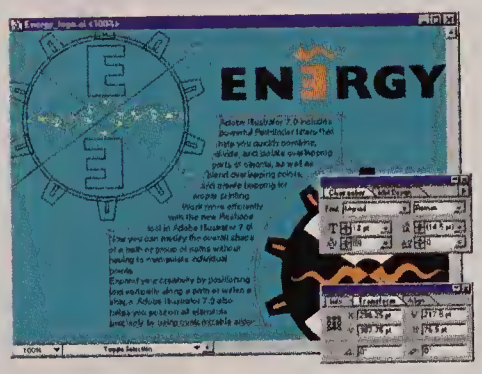

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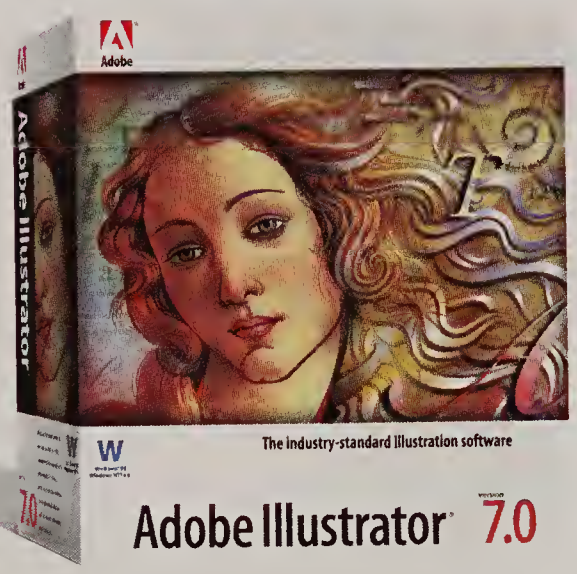

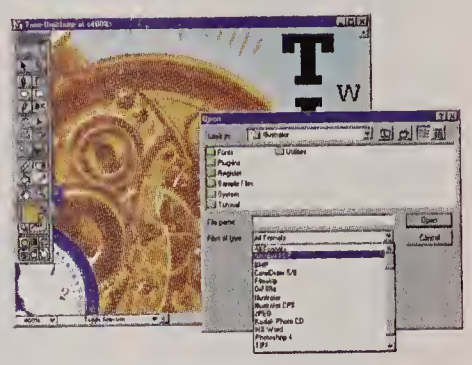

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WANT GOOD

BY NAOMI WISE

TECH SUPPORT? Good Luck...

We called, we e-mailed, we checked out Web sites. Our findings: Tech support from major software companies is rarely quick, seldom easy, and sometimes downright lethal.

SOME PEOPLE MAY BELIEVE that invisible angels hover over their shoulders as they work. But most computer users know it's the Devil they'll eventually meet in the details of their software. When good software goes bad (or is just devilishly difficult to use), who're you gonna call? You could look for an exorcist, but more likely you'll cleave to the earthly solutions of tech support.

A few support departments are heavenly indeed, but with others you must hack your way through a thicket of voice-mail menus to reach the lair of the technicians.

While some software vendors still offer free support through either toll or toll-free lines, most now require an up-front credit card outlay, especially for no-wait service. Nearly every vendor also offers some form of support online, the bulk of it free, but occasionally involving a fee for quick-turnaround e-mail.

To find out just how good software support really is, we assembled a team of reviewers to pose as innocent software users and try various support options. *PC World* experts devised real-world questions for six popular products from Corel, Intuit, Lotus, Microsoft, Netscape, and Symantec.

Our callers asked the same questions both on the phone and online. Then they compared the answers they received with the *PC World* experts' solutions.

The results of our tests prove what we all suspected: People answering tech support phones can be just as confused as you are. Paying for support doesn't guarantee a solution to your problem. Online support can be extremely helpful—if you have the time to search through the labyrinth of information offered.

Despite these negatives, there is good support out there. We found that some companies delivered solutions more consistently than others. Read on for details. ▶

MICROSOFT

The Bigger They Are, the Harder the Call

MANY USERS see Microsoft's technical support as off-limits because of the company's well-publicized fees for premium support. The truth is, though, you really can get free, unlimited toll-call support for most Microsoft desktop products (such as the Office suite or one of its components) if you bought them retail.

For preinstalled programs, you'll have to get support through your computer's manufacturer.

We mainly used fee lines to look into the company's software support. A Microsoft spokesperson subsequently confirmed that you'll reach the same set of techies whether or not you pay, unless you're buying pricey "consultant" support. We chose questions applicable to Word 7, since most of our readers use it and because support technicians should be familiar with it by now.

At Your Own Risk. Calling Microsoft, we found, can be unsafe at any price. Its products are the heart of most PCs, so if a technician suggests major software surgery to correct a minor problem, the results can be highly destructive. That's because the changes can affect Windows 95 as well as the application being "fixed." And overelaborate "fixes" were the order of the day.

By the time *PC World*'s Word tester, Michael Cahlin, was done following support instructions, his system was about done for, too. Microsoft, like most other software companies, covers itself legally with a disclaimer that states you use its telephone and e-mail support at your risk. Microsoft will try to help you fix any problems its advice causes, but if it didn't see you make the changes—who knows?—maybe you bollixed the instructions.

EASY

When I click once, Word highlights the text rather than positioning the cursor where I want it.

MODERATE

How can I set up Word with justified text as the default?

HARD

The Tools menu Customize command isn't there anymore. How can I get it back, since I can't get to the Customize dialog box now?

On call number one Microsoft's basic fee-based weekday support line picked up so quickly that Michael didn't even hear the phone ring. But then the voice-mail menus started, including a nudge for the pricey Priority Annual Support service. Once Michael emerged from the menu maze, his call was answered immediately. Unfortunately, the technician he reached treated Michael like a well-intentioned idiot, then quickly provided stunningly wrong answers to all three of the questions.

Calling at night proved slower and even more perilous. Michael listened to 14 minutes of singers "telling me their love was getting stronger the longer I held online," and then other vocalists urging, "don't go nowhere." Finally, a nonsinging human came on—but she was a technician for the PowerPoint application, not for Word. Rather than transferring Michael, she assured him she'd be able to help. Wrong. Her solution to our easy question resulted in damaging changes to the Windows Registry. (The correct answer called for a mere double-click.)

When Michael contacted Microsoft's per-incident paid support, his call was answered immediately. A representative took a credit card number, then promptly connected him to a well-spoken engineer who'd been working in tech support for a whopping three years—a veteran. The first question stumped the engineer: Like the other techies, he posited some mysterious catastrophe (perhaps involving the mouse driver) rather than just an accidental keystroke. But his other two answers were near-perfect.

Overall, out of the nine questions they were asked, the three Microsoft technicians came up with a total of two correct answers.

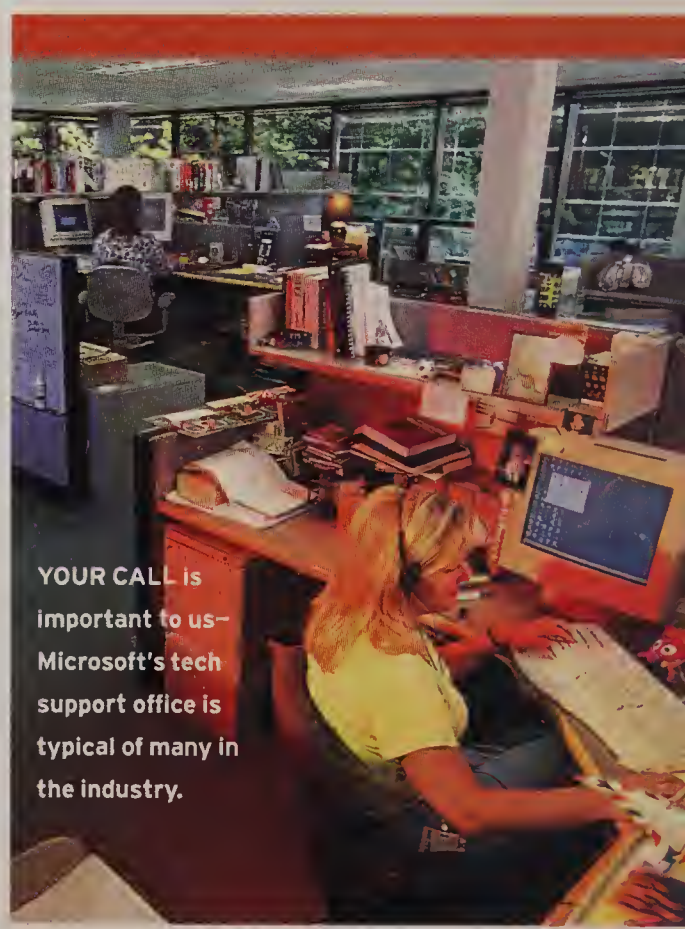
WAIT, THERE'S more! You'll **find the answers to the test questions** as well as expanded coverage at PC World Online: www.pcworld.com/oct97/support

Microsoft Online: Needle in a Haystack. At Microsoft's support Web site, it's easy to get updates, bug news, and product fixes and to learn what's new. But getting help with specific problems is not so simple. During peak hours you may not be able to reach the site at all—and if you do arrive, and your answers are not on the site's list of frequently asked questions, you can spend hours and still come up empty-handed.

'Search' a keyword, and you'll most likely get *too* many responses. Then you must refine your search with additional keywords. If you still can't find an answer, you can request e-mail support. Michael tried each resource, first perusing Microsoft Word Archives and the FAQs. He then went to the easy-to-use Troubleshooting Wizards, but his keyword entries brought up nothing useful.

Next, Michael tried Microsoft's Knowledge Base, the same encyclopedic tool that Microsoft's own technical help staff wrote and uses: "Even if you do find something relevant," he reports, "it's like trying to read a publication by the IRS."

Finally, he signed up for the $15 pay-per-incident e-mail support—a surprisingly convoluted process. He submitted his question but never received a response.



YOUR CALL is important to us—Microsoft's tech support office is typical of many in the industry.

SYMANTEC

Nice Answers When You Can Get Them

SYMANTEC'S TECHNICAL help department initially acts as if it would rather not hear from you. There's no toll-free number and no weekend or after-hours live support. New users can receive free telephone support for the cost of the call for 90 days from the date of their first call. After that, the company's Web site is the best means of free support.

We called for support for Symantec's Norton Utilities for Windows 95 and learned that if you have the fortitude to make your way through tech support's thorny barriers, you'll be duly rewarded.

Voice Mail Hell for Dummies. Most Symantec support staffers really seem to know their stuff. (Nine questions brought eight good-to-flawless answers and one near-right solution). The problem lies in reaching these pros.

Symantec picks up the line immediately but then bombards you with endless menu choices. If you choose Norton Utilities for Win 95, you hear a long recorded litany of problems (and some solutions), intended for anyone foolish enough to try coercing Norton and Microsoft Office into peaceful coexistence on a single system. When the oration ends, you suffer through more menus and recitations before you're mercifully asked to "hold for the next available agent."

On his first call, tester Michael Cahlin listened to a jukebox-full of on-hold music and then a pitch for faster service—just call one of the fee-for-service lines. After 12 minutes, a live technician swiftly gathered Michael's name and phone number and assigned him a "contact ID" number. (The ID automatically brings up a file containing your name and data on future calls.)

EASY

I want to update my Rescue Disk. When I double-click the sensor in the Norton System Doctor, all I get is its Properties page. If I right-click on the sensor and choose Update, nothing happens.

MODERATE

My disk is messed up, and I want to run the Norton Diagnostics. Is there a way to do this when Windows 95 won't open?

HARD

Using the Swap File Utilization utility, I see that my Windows 95 swap file is 96 percent in use. Does this mean I should make my swap file bigger?

The first technician answered all three questions correctly, including a resourceful and exacting solution for the second question. The next call elicited even better support, from a technician who proved exceptionally patient and knowledgeable as he walked Michael through detailed (and correct) answers. So far, the score was a perfect six out of six.

Then Michael called the toll-free Premium Care Management (for a $29 per-call fee). The wait was brief—only about 15 seconds. The technician gave correct answers but eccentric explanations: That is, he aced the multiple-choice quiz but blew the essay question. We'd score him right on two out of three of his answers.

Symantec Online: The Slow Genie. Michael started his Web visit with Symantec's cool-looking Support Genie. He soon discovered that it's faster to bypass the graphical Genie wizard in favor of the text version—otherwise, the poky help features tend to time out. The Genie focuses on keywords but offered irrelevant answers to all three questions. The FAQ didn't touch the questions, either—nor could the Knowledge Base come up with specific solutions. After an hour of frustration, Michael tried the Discussion Groups but couldn't get through. Finally, he posted the questions on the Customer Service Discussion Group forum. Two weeks later, he'd gotten no replies. ▶

Timmy AND THE Temps

The Hidden World of Tech Support

SAY HELLO TO "TIM," a typical support technician who was willing to disclose the other side of tech support—anonymously, of course. For six months Tim has worked as a technician at one of several third-party companies that contract with Microsoft to handle overflow support calls. Apparently he is not happy in his work, nor unique in his discontent.

If Tim and his colleagues were a rock band, they'd be called Timmy and the Temporaries. Six months, Tim says, is average tenure before a techie moves on to better things; nine months makes a seasoned, wizened veteran. Tim's background is typical: a general high-school diploma and a military stint "working with computers."

To break into the exciting, lucrative computer industry, Tim had to start in the basement (or dungeon) known as a technical help department. Most coworkers, he found, were similarly motivated: "They don't have anything else to do with their computer skills." Many are off-the-street hires or are on six-month contracts with temp agencies. For $9 to $12 per hour, these hired guns start with three weeks of classroom training, then complete two probationary weeks of simulated and real calls.

Tim is supposed to check for answers in the Microsoft Knowledge Base, and if that doesn't provide an answer, to turn to more experienced hands through the inside "mentor queue," he says. More often, if the Knowledge Base fails him, Tim will turn to his peers. If nobody on the night shift's skeleton crew knows the answer, the techie fills out a form so a mentor can deal with the question the next day.

We asked Tim whether he knew of any detour around the maze of multiple-choice phone menus and hold times. Nope. What if you get a useless answer? Just ask (civilly, please) to have a supervisor call you back. If you hit a great technician, can you get your future calls routed to her? "Sorry," says Tim. "No way except by hiring her yourself." So it's purely random: Some days you get the ace, and some days you get—Tim. —N. W.

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NETSCAPE

Web of Intrigue

NETSCAPE doesn't offer much support, but what you do get, you get rapidly: Technicians answered each of our calls within 15 seconds. Officially, Netscape offers support only for the installation of *purchased* Navigator packages (not for the downloaded evaluation version, which tester Kirk Steers was using).

Help with anything further costs $25 per question. However, some technicians will freely answer questions that have nothing to do with installation.

Others not only collect your money but won't let you pass Go unless you can prove you bought the software. When challenged, our tester insisted that paying $25 for the tech-support call was enough, and he told the technician to stop hassling him about using an evaluation download. This approach always seemed to work.

Right Answers (Sometimes) for a Fee (Always). The Netscape voice-mail menu is complex and impatient, and callers who get lost in it are rapidly dumped on the first available technician. Since each question requires a separate $25 call, Kirk spoke with nine different staffers. All who faced the easy question got it right. Not a one could ace our moderate question. The hard question brought two right answers and one wrong.

When Kirk asked either of the two harder questions, four of the technicians insisted on knowing the origin of his Navigator. They balked at serving someone who had downloaded a free evaluation copy (even though the company was collecting $25 per phone call). Only one technician suggested that Kirk could call back for free if the first call didn't solve the problem. Netscape staff answered five out of nine questions correctly. Four techies were friendly and competent, two were friendly and incompetent, and three came across like IRS auditors.

Netscape Online: The Kindness of Strangers. Netscape's spiffy Web page outlines three steps for solving a problem. The FAQ is, as usual, great for common problems and useless for obscure ones. The Knowledge Base solved the easy problem quickly and included good background info, but no direct answer for the hard one. Kirk tried Netscape's newsgroups with the question, and two days later he received two replies—including one from a kind soul who answered correctly in two pithy sentences. ▶

QUESTIONS

EASY

When I access my favorite newsgroup, I get the message 'NNTP Error. No Permission to Talk'. Why?

MODERATE

When I try to open Navigator, all I get is my default home page—no menu bar, toolbar, or other controls. I can't enter an address, access my bookmarks, or anything. All I can do is click on links that are on that page.

HARD

I'm consistently getting '404 Not Found' errors, and I know the pages exist. What gives?

Help, Help—AND MAKE IT Quick!

Tips for Getting Better Software Support

Register. Some vendors are reluctant to provide support unless they're sure you paid for the software.

Keep notes. Document the symptoms and write down the steps you're given to remedy them.

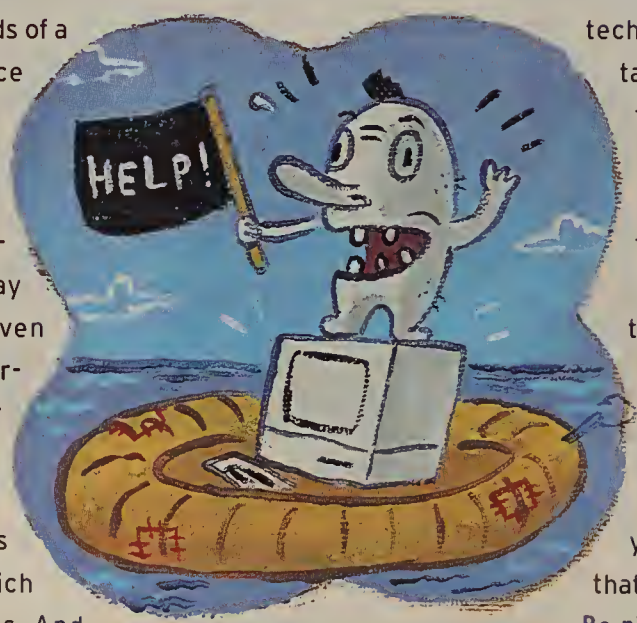
Ask your friends first. Find out if they've encountered the same problem and whether they were able to solve it.

Ask the universe. If you've got time to research a solution, try online newsgroups, user groups, mailing lists, and subscription-based services. Expert users can often give better advice than some hurried hireling.

Avoid after-hours calls. Not only does night and weekend support often cost extra, but it may put you in the hands of a skeleton staff of novice technicians.

Go local. Ask your retailer if it would be willing to seek out answers for you if you pay the store (you may even get it free if you purchased your computer there recently).

Log your calls. You'll save time on future calls if you jot down which menu options to press. And when you reach a technician, write down all the instructions—preferably *before* you try them on your computer. This will give you a record in case something happens to go wrong.



Back up and boot. During tech support calls, the technician typically walks you through the solution in real time, but if that remedy is both drastic and wrong, it may wreck all your custom configurations (or even fry your entire system). So have a backup and boot disk just in case.

Authenticate. Once you reach tech help, make sure you're talking to a representative from the division that provides support for the product. Don't take advice from a different division.

Identify. Write down your techie's name, and immediately give your own name and phone number for a callback in case you get disconnected. (Otherwise you'll have to listen to all that Vivaldi again.)

Be nice. On the telephone or online, be calm, tactful, and succinct in your questions—and don't forget to give praise when it's warranted. (Techies often mirror their callers' attitudes; after all, they're human, too.) —N. W.

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LOTUS

Easy as 1-2-3

When we called Lotus, we generally encountered a high level of service, getting both speed and accuracy. Waits were short, the voice-mail menu was brief and easy to navigate, and the answers were correct. But our third question involved LotusScript—a program still so new, only a few people had been trained to support it at the time of our research.

In each case, though, our Lotus tester, Contributing Editor Kirk Steers, received a callback with the answer within 4 hours. Monetarily, however, support is geared more toward corporations than to individual users or small businesses, with pay-to-play kicking in early and high. For the first 60 days, business-hours support is free for desktop products (but it requires a toll call); the free period drops to 30 days for communications products.

After that, or after hours, users with shallow pockets must go to Lotus's Web site and hunt for information. The alternative is to pay dearly for help.

Smart and Sweet. Tester Kirk Steers made all his phone calls during business hours, using Lotus's free support lines; all calls were picked up on the first ring.

Kirk already had a support ID number; when he entered it, the brief voice-mail menu quickly led him to the correct queue. Music ("a nice blues piece," according to Kirk) alternated with a wait-jockey reporting on traffic conditions at the site. In all three calls, Kirk was connected with a live person in less than a minute from the time he completed his obligatory voice-mail choices.

On Kirk's first call, the technician nailed the first two questions. When Kirk bemoaned some cumbersome chores of converting to the new scripting language, the technician sympathized. For the hard question, the technician reluctantly gave up after 10 minutes of research and transferred Kirk to the special LotusScript queue, where he left his name and number. Kirk got a callback a few hours later with an accurate answer.

The next call was similar, but this time an even smoother operator handled Kirk's feigned surliness so adeptly that he concluded, "Good thing I wasn't in the market for a used car."

The third call reached an apparently brand-new technician who endured the first two questions in evident terror. He got the easy one right but put Kirk on hold for 8 minutes to research the moderately difficult one.

He came back with the right answer, but his comments indicated he did not fully understand the implications.

Kirk didn't ask this technician the hard question, since its answer relied to some degree on the answer to the moderate question.

Overall, out of the eight questions asked, Lotus technicians provided seven correct responses: Four were immediate, and one was answered accurately in a callback.

Lotus Online: Spreading the Sheet Around. Kirk found Lotus's Web site easy to use. The Lotus Knowledge Base, he says, "appears to have considerable depth across all of Lotus's products, as well as a friendly search interface."

For the first question, Kirk (a spreadsheet pro) typed 'hiding sheets' in the search dialog box and received over 20 responses; the lead item contained the dead-on answer. But he knew the right keywords. If you don't, your search could be much longer and more frustrating.

Our admittedly savvy Web user needed only 5 minutes in all to obtain answers to our other questions. Novice search-engine users may take somewhat longer.

EASY

I've created a sheet and want to hide it using either the Sheet, the Hide, or the Sheet Properties' 'Hide sheet' option. But 'Hide sheet' is grayed out and unavailable. What do I do?

MODERATE

In 1-2-3 97 for Windows 95, I'm trying to record a macro. But none of the menus refer to either recording or running macros.

HARD

My scripted subroutine uses a Cell event such as CellContentsChange. I changed the name of the subroutine, and it will no longer run.

BEFORE YOU CALL TECH SUPPORT

- HAVE A PEN and pad handy for writing down telephone menu choices, names of people you speak to, and answers to questions.
- Be ready to provide the product identification number of your copy of the software.
- You may need to supply hardware details. (In Windows 95, you'll find this information by right-clicking the *My Computer* folder and selecting *Properties*.) If you don't know the specifics by heart, write down your PC's model number (or at least the type and speed of the processor), the RAM capacity, and model names of any hardware affected by the problem.
- Describe the problem as clearly as you can, and note all the steps you've taken to remedy it. (Writing all of this down before you call may help you explain the problem more clearly.)
- Bring up the errant program on your computer before you phone (if it will load, that is).

COREL

Drawing Conclusions

Corel provides free technical support for its products, but you pay for the toll calls to Ottawa, Ontario, which can quickly become expensive. (Support for Corel's recently acquired WordPerfect remains in Orem, Utah.)

At the main Corel tech support number, users asking the five most common questions are steered through voice mail to recordings that can solve their simple problems in a jiffy; if the answers there don't cut it, you can choose to be connected to a technician or opt to receive a ▶

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longer faxed publication on the question.

Corel's e-mail tech support is newly available on the Web. Called Answer Perfect, it promises turnaround in one business day but charges $14.95 per question. (If your question requires a complicated answer, this charge may be less than you'd pay to phone Canada during peak toll hours.) Our Corel tester, Contributing Editor Judy Heim, focused on CorelDraw 7, which was recently packaged with WordPerfect and has quickly acquired many new users.

Hold for Rachmaninoff. Unfortunately for those with more complex problems, Corel's voice-mail menu can run up toll charges for as long as 6 minutes. And Judy's woes were compounded: During our testing period, Corel's phone lines were being upgraded to correct a telephone company bug that disconnected anyone who waited more than 10 seconds before selecting a menu choice. Between this electronic rudeness, the upgrading (which caused some glitches of its own), and the endless menu, Judy had a miserable time reaching the "hold for the next available agent" message. The hold time featured classical music, interrupted every few bars by recorded ads for Corel products and seminars.

On the first call it took 11 minutes to reach a live voice. A friendly, very knowledgeable technician issued Judy a customer ID number to use in future calls and answered the easy question correctly. She also gave a fine, detailed account that included tips on making full use of the program. ("Bonus points here," Judy reports.) The second call for the moderate question involved a trying 6 minutes of voice-mail choices, plus 14 minutes of Rachmaninoff and product ads. Finally, another friendly technician provided a correct answer. With the hard question, total time from touch-tone to live and friendly human was just 6 minutes. His answer was accurate in concept, but he didn't seem to know the exact steps that Judy needed to go through to reach the desired result.

Corel Online: Hello, Is Anybody There? Judy tried the searchable FAQ database and the messages in Corel's online support forum—populated by users, but monitored by a technician who steps in on questions that aren't getting any takers. The answers weren't there, but Judy concluded, "This support forum is at least a pretty good place to look for explanations of CorelDraw's cryptic error messages." The new $14.95 Corel e-mail service, AnswerPerfect, wasn't in effect at press time but promises responses within one business day.

QUESTIONS

EASY

I opened a GIF file in CorelDraw 7. I can't seem to change the colors with the fill tool, paint over the image with the spray-can tool, or in fact paint any parts of it at all.

MODERATE

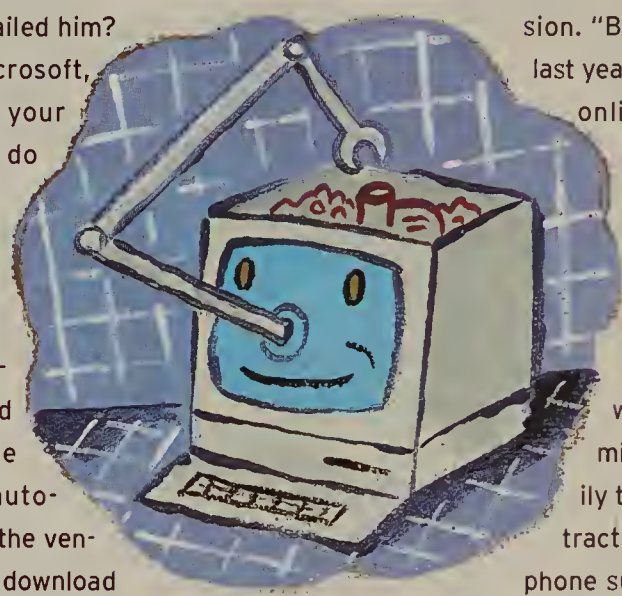
I want to create a fill pattern using a scanned picture of my kids. How do I do this?

HARD

Can I get a diamond-shaped grid for precise drafting?

THE Future OF Tech Support

REMEMBER HOW the android Data in *Star Trek: The Next Generation* would run self-diagnostics and heal himself of what ailed him? According to Microsoft, someday soon your computer might do exactly that—with the help of a service that you subscribe to. The service will analyze hardware and software, find the problems, and automatically access the vendor's Web site to download and install whatever medicine the system needs (new drivers, bug patches, and so forth). All this will happen in the background, so you won't even be aware of it.



In the more immediate future, individual users may have to develop their own software-healing skills. Vendors are relying increasingly on Web site help and sponsoring user forums. These tools ostensibly will become easier to use, even as other forms of support (mainly phone-based help) become less accessible.

"The primary users of Web site support today are information technology professionals, who are more advanced than the end users," says Denise Rundle, program manager of Microsoft's Support Online division. "But we've spent the last year trying to make our online support easy enough so that anyone can use it."

More and more, telephone support is becoming confined to businesses willing to pay a premium for help, primarily through annual contracts. Furthermore, the phone support will increasingly be contracted to third-party enterprises. While Microsoft and Lotus are already using third parties, third-party support for individual end-users will likely vanish in the face of consumer dislike for purchasing such contracts. —N. W.

INTUIT

Quick but Incomplete

INTUIT PROVIDES free technical support for its programs, but it's available through toll numbers located in Arizona or Virginia. It also has a forum on America Online, with bulletin boards where users can post questions and receive answers from technical staff (typically within two business days).

We created several questions for Quicken 6, the most recent version of the leading money management program.

Easy Does It. Tester Judy Heim's calls to the support number listed on the Quicken box required a few quick voice-mail choices and usually less than 2 minutes on hold. A pleasant-sounding woman answered the easy question immediately. The moderate question reached an ▶

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unenthusiastic technician who said he'd never heard of the error message and hadn't "the foggiest idea" what to do about it. He finally came up with a totally wrong answer.

The techie who fielded the hard question was friendly, intelligent, and articulate. Her simplified answer was correct as far as it went but didn't quite solve the problem (she missed a vital step).

All in all, three calls brought a 50 percent rate of correct answers, if you count the final answer as half-right.

Intuit Online: Slim Pickings. The company's Web site doesn't have a user forum, but it does offer an FAQ where Judy actually found the answer to the easy question—in full, including directions for replacing the unwanted sound effect with a better one.

She found no answer to the moderate question, and half an answer to the hard one, with instructions for converting records from DOS to Windows Quicken 6. But there was no help at all about what to do when transactions seem to be missing in action.

Subsequently, we posted the easy and hard questions on the AOL Intuit user forum bulletin board and received replies in 12 hours. The answers were correct and to the point.

EASY

How can I get rid of the obnoxious cash-register sound that occurs whenever I complete a transaction?

MODERATE

I just got an error message: 'Damaged Bag Item'. What does it mean, and what should I do now?

HARD

I upgraded from Quicken 7 for DOS, and some transactions are missing.

CONCLUSION

Good Help Can Be Hard to Find

AFTER ALL THESE TESTS, we're left to draw a few lessons. First, the level of technical support varies drastically from one company to the next, with the lowest percentage of correct answers coming from the companies with the most widely used products (Microsoft's Word and Intuit's Quicken). And it doesn't seem to matter much whether the support is free or for a fee, although in some cases paying brings quicker service.

Some of the best service is attached to high-end support packages (such as Lotus's corporate-directed plans), whose prices are attuned more to Fortune 500 budgets than to end users' wallets.

Overall, we found that Symantec and Lotus offered the best, most on-target phone support. Both had the best average in solving the questions we posed to them. Online, Lotus was equal to the task, but Symantec's graphical, we'll-make-it-easy-for-you approach was slow going.

Online support is great for do-it-yourselfers who have the time and the patience to search for answers in the vast sea of FAQs, knowledge bases, and companies' and forum users' responses to e-mail questions.

An additional rule of thumb: Technicians who are friendly, enthusiastic, and patient are also most likely to give correct answers. The grumps are probably that way because every call strains their meager skills. Accordingly, if you reach a grouch, you're probably better off ending the call ASAP and starting over. It'll save you time and grief in the long run, because those bad technicians won't exorcise your software's devils—and they may install a whole new bunch.

Naomi Wise is a freelance writer in San Francisco. Contributing editors George Campbell, Judy Heim, and Kirk Steers and Los Angeles freelance writer Michael Cahlin created the questions and answers used in our testing. Michael S. Lasky is a senior associate editor for PC World. ■

Third-Party SUPPORT

No Party, Little Support

IT'S A GREAT IDEA: Pay one price to a single company that will handle all your software problems.

So why hasn't this caught on? We got an inkling after we tried the services of Software Support, CompUSA, and Sitel Technical Services. When we called Software Support with our Netscape Navigator questions, we were first told the company didn't support Navigator—even though its Web site and brochure claimed it did. Another technician told us he could answer Navigator questions, but the call would cost $25. However, even after consulting with supposed Navigator experts, he couldn't give any answers.

Neither could the technicians at CompUSA's CompCare 900, a $2.49-per-minute national service (www.compusa.com). Our testers called with questions on Intuit Quicken 6, CorelDraw 7, and Navigator 3. Some technicians tried to bluff answers when it was clear they did not know the program at all. Others were quick to admit they had no idea, and referred us to the software vendor's support number. But they didn't even get that right, more than once giving our testers a disconnected number for a vendor.

The third company we tried, Sitel Technical Services (800/337-6906) was found through a Web search (www.etg-helpdesk.com), but it proved disappointing. Thirty bucks later, Sitel still had not answered our Microsoft Word questions. The Sitel tech finally suggested that we reinstall the program, when in fact the problem could have been solved simply with a double-click of the mouse. —Michael S. Lasky

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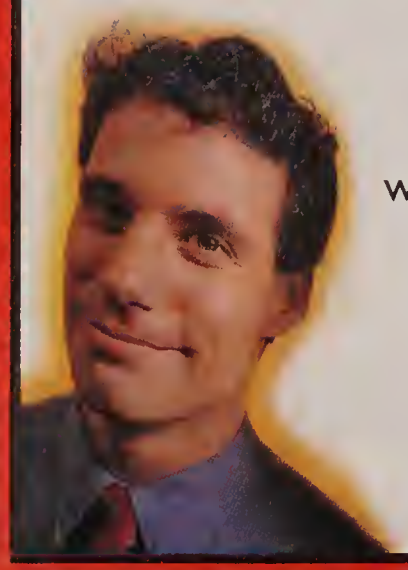

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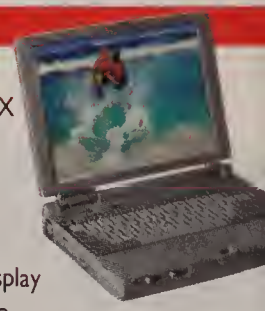

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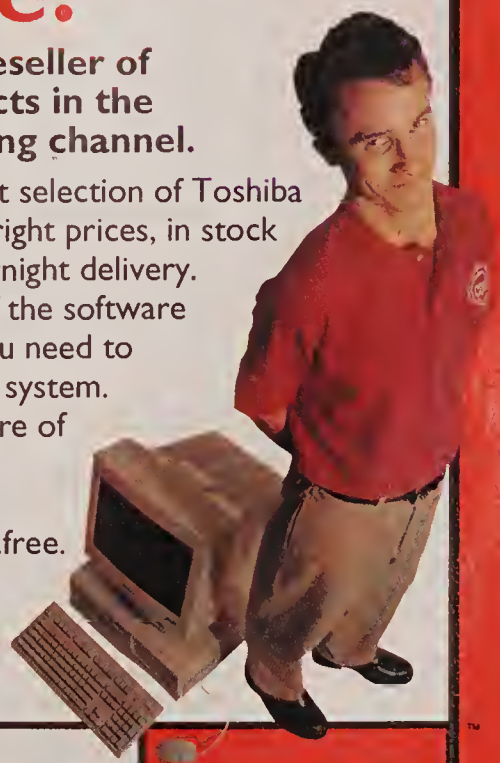

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- 6.1" active-matrix display

1.85 lbs.

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TOSHIBA

Tecra 500CDT

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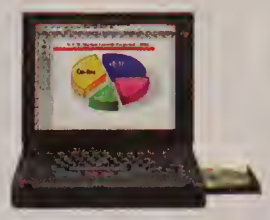
- 16MB EDO RAM standard, expandable to 144MB
- 1.26GB hard drive
- 6X CD-ROM drive interchangeable with standard 1.44MB floppy drive
- 12.1" active-matrix SVGA color display
- Integrated 28.8K bps data/fax/voice modem

$1995.94 CDW 70243

IBM

IBM® ThinkPad® 380D

- 150MHz Intel Pentium® processor
- 16MB EDO RAM standard, expandable to 80MB
- 1.35GB hard drive
- 8X CD-ROM drive
- 12.1" dual-scan SVGA color display



$1999.50 CDW 86304

IBM

IBM® ThinkPad 760XD

- 166MHz Intel Pentium® processor with MMX technology
- 32MB EDO RAM standard, expandable to 104MB
- 3GB hard drive
- 8X CD-ROM drive
- 12.1" XGA active-matrix color display
- 28.8K bps data/fax modem

$4679.37 CDW 84101

Notebooks

Model	Processor	RAM std./max.	Hard drive	CD-ROM	Color display	Modem	Pointing device	Features	Price	CDW
Toshiba										
Satellite 220CDS	133MHz Pentium	16MB/144MB	1.34GB	10X	12.1" dual scan	—	AccuPoint track stick	Lithium ion battery	$1899.13	89777
Satellite Pro 440CDX	133MHz Pentium MMX	16MB/144MB	1.34GB	10X	12.1" dual scan	—	AccuPoint track stick	Lithium ion battery	$2359.54	90351
Satellite Pro 440CDT	133MHz Pentium MMX	16MB/144MB	1.34GB	10X	12.1" active matrix	33.6K bps	AccuPoint track stick	Lithium ion battery	$2799.55	90352
Satellite Pro 460CDT	166MHz Pentium MMX	32MB/160MB	2.02GB	10X	12.1" active matrix	33.6K bps	AccuPoint track stick	Lithium ion battery	$3659.16	90353
Portege 300CT	133MHz Pentium MMX	32MB/64MB	1.5GB	—	10.4" active matrix	33.6K bps	AccuPoint track stick	external floppy	$3369.46	90354
Portege 660CDT	150MHz Pentium	16MB/80MB	1.2GB	10X	11.3" active matrix	28.8K bps	AccuPoint track stick	external floppy	$3899.63	77243
Tecra 500CDT	120MHz Pentium	16MB/144MB	1.26GB	6X	12.1" active matrix	28.8K bps	AccuPoint track stick	16-bit stereo sound	$1995.94	70243
Tecra 510CDT	133MHz Pentium	16MB/144MB	2.1GB	10X	12.1" active matrix	28.8K bps	AccuPoint track stick	16-bit stereo sound	$2699.76	77241
Tecra 520CDT	166MHz Pentium MMX	32MB/160MB	2GB	10X	12.1" active matrix	33.6K bps	AccuPoint track stick	SVGA resolution	$4159.45	90355
Tecra 530CDT	166MHz Pentium MMX	32MB/160MB	2GB	10X	12.1" active matrix	33.6K bps	AccuPoint track stick	XGA resolution	$4579.17	90359
Tecra 730XCDT	150MHz Pentium MMX	16MB/144MB	2GB	10X	12.1" active matrix	28.8K bps	AccuPoint track stick	full duplex speakerphone	$3499.77	80957
Tecra 740CDT	166MHz Pentium MMX	16MB/144MB	3GB	10X	13.3" active matrix	28.8K bps	AccuPoint track stick	video conferencing kit	$4849.62	87964
Tecra 740CDT	166MHz Pentium MMX	16MB/144MB	3GB	10X	13.3" active matrix	28.8K bps	AccuPoint track stick	Windows NT V4.0	$4999.31	87965
Compaq Armada										
1530DM	133MHz Pentium MMX	16MB/80MB	1.4GB	10X	12.1" dual scan	33.6K bps	touch pad	full duplex speakerphone	$2499.00	91507
1550DMT	133MHz Pentium	16MB/80MB	1.4GB	10X	12.1" active matrix	33.6K bps	touch pad	full duplex speakerphone	$2999.00	87070
1580DMT	150MHz Pentium MMX	16MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	touch pad	full duplex speakerphone	$3499.00	90959
4130T	133MHz Pentium	16MB/48MB	1.08GB	—	11.8" active matrix	—	touch pad	16-bit stereo sound	$2497.23	71116
4131T	133MHz Pentium	16MB/48MB	1.4GB	—	12.1" active matrix	—	touch pad	16-bit stereo sound	$2849.00	80775
4150	150MHz Pentium MMX	16MB/80MB	1.6GB	—	12.1" dual scan	—	touch pad	16-bit stereo sound	$2999.00	91508
4160T	166MHz Pentium MMX	16MB/80MB	2GB	—	12.1" active matrix	—	touch pad	16-bit stereo sound	$3999.00	91509
7330T	150MHz Pentium MMX	16MB/128MB	2.1GB	—	12.1" active matrix	—	EasyPoint III track stick	16-bit stereo sound	$4399.00	93735
7350MT	166MHz Pentium MMX	32MB/128MB	2.1GB	—	12.1" active matrix	33.6K bps	EasyPoint III track stick	16-bit stereo sound	$4899.00	93736
7710MT	150MHz Pentium MMX	16MB/144MB	1.6GB	optional	12.1" active matrix	33.6K bps	EasyPoint III track stick	64-bit PCI bus	$4399.00	88242
7730MT	166MHz Pentium MMX	32MB/144MB	2.1GB	optional	12.1" active matrix	33.6K bps	EasyPoint III track stick	64-bit PCI bus	$4999.00	88241
7750MT	166MHz Pentium MMX	32MB/144MB	2.1GB	optional	12.1" active matrix	33.6K bps	EasyPoint III track stick	64-bit PCI bus	$5799.00	88240
Compaq Presario										
1610	150MHz Pentium MMX	16MB/80MB	1.6GB	14X	12.1" dual scan	—	touch pad	16-bit stereo sound	$2699.00	90515
1585DMT	150MHz Pentium MMX	16MB/80MB	2.1GB	12X	12.1" active matrix	33.6K bps	touch pad	16-bit stereo sound	$3499.00	92232
IBM ThinkPad										
380	150MHz Pentium	16MB/80MB	1.08GB	optional	12.1" dual scan	—	TrackPoint III track stick	16-bit stereo sound	$1699.46	86302
380D	150MHz Pentium	16MB/80MB	1.35GB	8X	12.1" dual scan	—	TrackPoint III track stick	16-bit stereo sound	$1999.50	86304
380D	150MHz Pentium MMX	16MB/80MB	2.1GB	8X	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$3287.43	86305
560	133MHz Pentium	8MB/40MB	2.1GB	—	11.3" dual scan	—	TrackPoint III track stick	external floppy	$1899.56	81184
560	133MHz Pentium	8MB/40MB	2.1GB	—	12.1" active matrix	—	TrackPoint III track stick	external floppy	$3789.45	81186
560E	150MHz Pentium MMX	16MB/80MB	2.1GB	—	11.3" dual scan	—	TrackPoint III track stick	16-bit stereo sound	$2599.86	89290
560E	166MHz Pentium MMX	16MB/80MB	2.1GB	—	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$4186.26	89291
760ED	133MHz Pentium	16MB/72MB	2.1GB	6X	12.1" active matrix	28.8K bps	TrackPoint III track stick	XGA resolution	$3739.72	74862
760E	150MHz Pentium	16MB/72MB	2.1GB	optional	12.1" active matrix	28.8K bps	TrackPoint III track stick	XGA resolution	$3578.40	74863
760XL	166MHz Pentium MMX	16MB/104MB	2.1GB	optional	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$3769.88	84102
760XL	166MHz Pentium MMX	32MB/104MB	2.1GB	optional	12.1" active matrix	—	TrackPoint III track stick	Windows NT V4.0	$4064.04	84103
760XD	166MHz Pentium MMX	32MB/104MB	3GB	8X	12.1" active matrix	28.8K bps	TrackPoint III track stick	XGA resolution	$4679.37	84101
765L	166MHz Pentium MMX	32MB/104MB	3GB	—	13.3" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$5999.71	89293
765D	166MHz Pentium MMX	32MB/104MB	3GB	8X	13.3" active matrix	28.8K bps	TrackPoint III track stick	Mwave DSP subsystem	$6659.22	89292

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Armada 7730MT

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$4999.00 CDW 88241

HITACHI

VisionBook Plus 4140

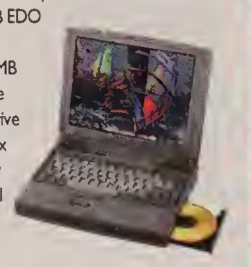
• 133MHz Intel Pentium® processor • 16MB RAM • 1.4GB hard drive • 10X CD-ROM drive • 12.1" dual-scan color display • 33.6K bps data/fax modem

$1799.00 CDW 91046

TOSHIBA

Satellite Pro 440CDT

• 133MHz Intel Pentium® processor with MMX technology • 16MB EDO RAM standard, expandable to 144MB • 1.34GB hard drive • 10X CD-ROM drive • 12.1" active-matrix SVGA color display • 33.6K bps internal data/fax modem



$2799.55 CDW 90352

Notebooks

Model	Processor	RAM std./max.	Hard drive	CD-ROM	Color display	Modem	Pointing device	Features	Price	CDW
AST Ascentia										
A60+	150MHz Pentium	16MB/80MB	1.44GB	10X	12.1" active matrix	—	SmartPoint touch pad	SRS 3D sound	$2658.65	B691B
A60+	150MHz Pentium	16MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	SmartPoint touch pad	SRS 3D sound	$2979.63	B9632
A70+	150MHz Pentium MMX	16MB/80MB	1.44GB	10X	12.1" active matrix	33.6K bps	SmartPoint touch pad	SRS 3D sound	$3075.78	B6919
A70+	150MHz Pentium MMX	16MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	SmartPoint touch pad	SRS 3D sound	$3445.14	89633
P70	150MHz Pentium MMX	32MB/80MB	2.1GB	10X	12.1" active matrix	28.8K bps	SmartPoint touch pad	32-bit PCI bus	$3559.65	87580
P80	166MHz Pentium MMX	32MB/80MB	3GB	10X	12.1" active matrix	28.8K bps	SmartPoint touch pad	32-bit PCI bus	$3997.62	B7629
Acer Texas Instruments										
Extensa 610CD	150MHz Pentium	16MB/64MB	1.4GB	10X	11.3" dual scan	—	touch pad	external floppy	$1964.67	88530
Extensa 610CDT	150MHz Pentium	16MB/64MB	1.4GB	10X	11.3" active matrix	—	touch pad	external floppy	$2549.84	BB531
Extensa 660CD	166MHz Pentium MMX	16MB/80MB	1.35GB	10X	12.1" dual scan	—	touch pad	16-bit stereo sound	$2699.55	B3363
Extensa 660CDT	166MHz Pentium MMX	16MB/80MB	2.1GB	10X	11.3" active matrix	—	touch pad	16-bit stereo sound	$3179.04	B3364
TravelMate 7060	166MHz Pentium MMX	32MB/64MB	2GB	10X	12.1" active matrix	33.6K bps	touch pad	16-bit stereo sound	$4289.59	8B471
TravelMate 7063NT	166MHz Pentium MMX	32MB/64MB	3GB	10X	12.1" active matrix	33.6K bps	touch pad	Windows NT V4.0	$4949.69	BB472
TravelMate 6160	166MHz Pentium MMX	32MB/96MB	2.1GB	10X	12.1" active matrix	33.6K bps	track stick	external floppy	$4699.26	B1406
Fujitsu LifeBook										
435Dx	133MHz Pentium MMX	16MB/80MB	1.3GB	10X	12.1" dual scan	—	touch pad	SVGA resolution	$1999.00	92945
555Tx	150MHz Pentium MMX	16MB/80MB	2GB	10X	12.1" active matrix	33.6K bps	GlidePoint touch pad	16-bit stereo sound	$3499.00	B500B
565Tx	166MHz Pentium MMX	32MB/96MB	2GB	20X	12.1" active matrix	33.6K bps	GlidePoint touch pad	XGA resolution	$4299.00	92055
635Tx	133MHz Pentium MMX	16MB/80MB	2GB	16X	12.1" active matrix	33.6K bps	touch pad	16-bit stereo sound	$3199.00	9205B
655Tx	150MHz Pentium MMX	16MB/80MB	1.3GB	BX	12.1" active matrix	33.6K bps	touch pad	external floppy	$3799.00	B5013
656Tx	150MHz Pentium MMX	16MB/80MB	2GB	16X	12.1" active matrix	33.6K bps	touch pad	SVGA resolution	$4299.00	92061
Hitachi VisionBook										
4140	133MHz Pentium	16MB/128MB	1.4GB	10X	12.1" dual scan	33.6K bps	touch pad	16-bit stereo sound	$1799.00	91046
4150x	150MHz Pentium MMX	16MB/128MB	1.4GB	10X	12.1" dual scan	33.6K bps	touch pad	16-bit stereo sound	$2499.00	91047
4360x	166MHz Pentium MMX	16MB/128MB	2.1GB	10X	12.1" active matrix	33.6K bps	touch pad	SVGA resolution	$3499.00	91049
7340	133MHz Pentium MMX	16MB/144MB	1.4GB	10X	12.1" active matrix	56K bps	GlidePoint touch pad	16-bit stereo sound	$3199.00	91051
7360	166MHz Pentium MMX	32MB/144MB	2.1GB	10X	12.1" active matrix	56K bps	GlidePoint touch pad	16-bit stereo sound	$4499.00	91053
7560	166MHz Pentium MMX	32MB/144MB	3GB	10X	13.3" active matrix	56K bps	GlidePoint touch pad	XGA resolution	$4999.00	91054
8560	166MHz Pentium MMX	16MB/80MB	2.1GB	10X	13.3" active matrix	56K bps	GlidePoint touch pad	XGA resolution	$4799.00	91056
Hewlett-Packard OmniBook Notebook PCs										
800CT	166MHz Pentium MMX	16MB/80MB	2GB	—	10.4" active matrix	—	TrackPoint III track stick	external floppy	$3679.68	B5727
5700CT	150MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$3597.52	B5720
5700CT	166MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	—	TrackPoint III track stick	16-bit stereo sound	$4039.53	B5721
5700CTX	166MHz Pentium MMX	16MB/128MB	1.86GB	optional	12.1" active matrix	—	TrackPoint III track stick	XGA resolution	$4098.82	B5723
5700CTX	166MHz Pentium MMX	32MB/128MB	2.79GB	optional	12.1" active matrix	—	TrackPoint III track stick	XGA resolution	$4574.01	B5722
Samsung Sens Pro										
521	133MHz Pentium	16MB/80MB	1.44GB	10X	12.1" active matrix	—	SensPad touch pad	16-bit stereo sound	$2349.27	BB011
523	133MHz Pentium	32MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	SensPad touch pad	16-bit stereo sound	$2834.59	BB00B
525	150MHz Pentium MMX	48MB/80MB	2.1GB	10X	12.1" active matrix	33.6K bps	SensPad touch pad	16-bit stereo sound	$3298.71	BB002

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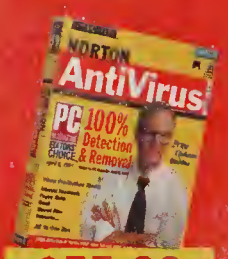

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Monitor sold separately

$1179.37 CDW B9298

COMPAQ

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• 133MHz Intel Pentium® processor • 16MB EDO RAM standard, expandable to 128MB • 1.2MB EIDE hard drive • 3-year limited warranty includes first year onsite

Monitor sold separately

$979.00 CDW 72608

COMPAQ

Presario 4504

• 200MHz Intel Pentium® processor • 16MB SyncDRAM standard, expandable to 64MB • 2.1GB EIDE hard drive • 16X Max EIDE CD-ROM drive • S6K bps internal data/fax/voice modem • 1-year parts, 1-year labor warranty; first year onsite

Monitor sold separately

$999.00 CDW 90509

TOSHIBA

Equium 5160D

• 166MHz Intel Pentium® processor with MMX Technology • 32MB EDO RAM standard, expandable to 192MB • 2.1GB hard drive • 12X CD-ROM drive • 10/100 Ethernet support

Monitor sold separately

$1418.82 CDW 8424B

Desktops

Model	Processor	Chassis	RAM std./max.	Hard drive	CD-ROM	Video	Modem	Ethernet	OS	Features	Price	CDW
Compaq Deskpro 2000												
5133/1200	133MHz Pentium	desktop	16MB/128MB	1.2GB	optional	Cirrus Logic	—	—	Win V3.1/Win 95	Intelligent Manageability	$979.00	72608
5133/2500	133MHz Pentium	desktop	16MB/128MB	2.5GB	optional	Cirrus Logic	—	—	Win V3.1/Win 95	Intelligent Manageability	$1089.00	72613
5166X/2100	166MHz Pentium MMX	desktop	16MB/384MB	2.1GB	optional	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1199.00	92269
5166X/3200	166MHz Pentium MMX	desktop	16MB/384MB	3.2GB	optional	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1309.00	92838
5166X/3200	166MHz Pentium MMX	mini-tower	16MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1619.00	92839
5200X/2100	200MHz Pentium MMX	desktop	16MB/384MB	2.1GB	optional	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1389.00	92840
5200X/3200/CDS	200MHz Pentium MMX	mini-tower	32MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1769.00	92842
5200X/3200	200MHz Pentium MMX	desktop	32MB/384MB	3.2GB	optional	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1579.00	92841
5233X/3200/CDS	233MHz Pentium MMX	desktop	32MB/384MB	3.2GB	16X Max	S3 Trio64V2/GX	—	—	Win 95	Intelligent Manageability	$1949.00	92843
6200/2500/CD	200MHz Pentium Pro	mini-tower	32MB/192MB	2.5GB	8X	Cirrus Logic	—	—	Win 95	Intelligent Manageability	$2109.00	72765
Compaq Deskpro 4000												
5133/1620	133MHz Pentium	desktop	16MB/256MB	1.62GB	optional	Cirrus Logic	—	10BT	Win V3.1/Win 95	Intelligent Manageability	$1199.00	72768
5133/1620/LS	133MHz Pentium	mini-tower	32MB/256MB	1.62GB	optional	Cirrus Logic	—	10BT	Win V3.1/Win 95	LS-120 drive	$1199.00	72780
5166X/2400	166MHz Pentium MMX	desktop	16MB/256MB	2.4GB	optional	S3 ViRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1389.00	92844
5166X/3200	166MHz Pentium MMX	desktop	32MB/256MB	3.2GB	optional	S3 ViRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1599.00	92845
5166X/3200/CDS	166MHz Pentium MMX	mini-tower	32MB/256MB	3.2GB	16X Max	S3 ViRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1799.00	92846
5200X/2400	200MHz Pentium MMX	desktop	32MB/256MB	2.4GB	optional	S3 ViRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1689.00	92847
5200X/3200	200MHz Pentium MMX	desktop	32MB/256MB	3.2GB	optional	S3 ViRGE/GX	—	10/100	Win 95	Intelligent Manageability	$1759.00	92848
6200/2500/LS/CDS	200MHz Pentium Pro	desktop	32MB/256MB	2.5GB	8X	Cirrus Logic	—	10BT	Win NT V4.0	LS-120 drive	$2149.00	72779
6233X/2500/CDS	233MHz Pentium II	desktop	32MB/192MB	2.5GB	8X	Cirrus Logic	—	10BT	Win NT V4.0	Intelligent Manageability	$2319.00	88475
Compaq Deskpro 6000												
6200/4200/PDS	200MHz Pentium Pro	mini-tower	64MB/256MB	4.2GB	optional	Matrox Millennium	—	10BT	Win NT V4.0	PD-CD Drive	$3099.00	84271
6200/2150/CDS	200MHz Pentium Pro	desktop	32MB/256MB	2.15GB	8X	Matrox Millennium	—	10BT	Win NT V4.0	Ultra SCSI	$2459.00	72786
6200/4200/PDS	200MHz Pentium Pro	desktop	32MB/256MB	4.2GB	optional	Matrox Millennium	—	10BT	Win NT V4.0	PD-CD Drive	$2789.00	84268
6233X/2150/PDS	233MHz Pentium II	desktop	32MB/192MB	2.15GB	optional	Matrox Millennium	—	10BT	Win NT V4.0	PD-CD Drive	$2629.00	88473
6266X/4200/CDS	266MHz Pentium II	desktop	32MB/192MB	4.2GB	8X	Matrox Millennium	—	10BT	Win NT V4.0	Ultra SCSI	$3179.00	88474
Compaq Presario												
2120	150MHz processor with MediaGX	desktop	24MB/128MB	2GB	8X	MPEG full-motion playback	33.6K bps		Win 95	10-stage equalization	$999.00	88172
2200	180MHz processor with MediaGX	desktop	16MB/64MB	1.6GB	8X	MPEG full-motion playback	33.6K bps		Win 95	10-stage equalization	$799.00	92852
4504	200MHz Pentium	mini-tower	16MB/64MB	2.1GB	16X Max	64-bit PCI accelerated	33.6K bps	—	Win 95	JBL Pro stereo speakers	$999.00	90509
4814	233MHz Pentium MMX	mini-tower	32MB/256MB	6.5GB	24X Max	64-bit PCI accelerated	56K bps	—	Win 95	Creative Imaging	$2299.00	90512
4824	233MHz Pentium II	mini-tower	32MB/256MB	6.5GB	24X Max	64-bit PCI accelerated	56K bps	—	Win 95	Zip drive	$2699.00	90513
IBM Aptiva												
C3E	233 MHz Pentium MMX	mini-tower	32MB/64MB	4.2GB	16X Max	ATI 3D RAGE II	33.6K bps	—	Win 95	Intel Video Phone	$1939.05	90536
C3D	233 MHz Pentium MMX	mini-tower	32MB/64MB	4.2GB	8X DVD	ATI 3D RAGE II	33.6K bps	—	Win 95	Intel Video Phone	$2699.00	90535
S9C	200MHz Pentium MMX	mini-tower	32MB/64MB	4.2GB	16X Max	ATI 3D RAGE II	33.6K bps	—	Win 95	Space-saving design	$1939.05	83775
S3C	233MHz Pentium MMX	mini-tower	32MB/64MB	4.2GB	16X Max	ATI 3D RAGE II	33.6K bps	—	Win 95	Space-saving design	$2299.00	90537
S35	233MHz Pentium MMX	mini-tower	48MB/64MB	6.4GB	24X Max	ATI 3D RAGE II	33.6K bps	—	Win 95	Space-saving design	$2699.00	90538
IBM PC Series												
PC 300GL	133MHz Pentium	desktop	16MB/256MB	1.2GB	optional	Cirrus Logic 5446	—	—	Win 95	Two USB ports	$979.89	85191
PC 300GL	166MHz Pentium	desktop	16MB/256MB	1.2GB	optional	Cirrus Logic 5446	—	—	Win 95	Two USB ports	$999.63	85188
PC 300GL	166MHz Pentium	desktop	16MB/256MB	2.5GB	optional	Cirrus Logic 5446	—	—	Win 95	Two USB ports	$1109.18	85190
PC 300GL	166MHz Pentium	desktop	16MB/256MB	2.5GB	16X	Cirrus Logic 5446	—	—	Win 95	Two USB ports	$1366.50	85189
PC 300GL	166MHz Pentium MMX	desktop	32MB/256MB	2.5GB	optional	Cirrus Logic 5446	—	—	Win NT V4.0	Two USB ports	$1419.28	85405
PC 300XL	233MHz Pentium II	desktop	32MB/384MB	2.5GB	16X Max	S3 Trio64V2	—	—	Win NT V4.0	Two USB ports	$2298.14	86313
PC 300XL	233MHz Pentium II	desktop	32MB/384MB	2.5GB	optional	S3 Trio64V2	—	—	Win 95	Ultra SCSI	$1999.38	86314
PC 300XL	266MHz Pentium II	desktop	32MB/384MB	4.2GB	16X Max	S3 Trio64V2	—	—	Win NT V4.0	Two USB ports	$2859.12	86315
PC 300XL	266MHz Pentium II	desktop	32MB/384MB	4.3GB	16X Max	S3 Trio64V2	—	—	Win NT V4.0	Two USB ports	$2969.24	86316

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$1588.65 CDW B4444

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- 166MHz Intel Pentium® processor with MMX technology
- 16MB RAM
- 2.5GB hard drive
- 8X CD-ROM drive

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$1439.22 CDW 91121

Desktops

Model	Processor	Chassis	RAM std./max.	Hard drive	CD-ROM	Video	Modem	Ethernet	OS	Features	Price	CDW
HP Vectra 500 Series												
525CD	133MHz Pentium	mini-tower	16MB/192MB	1.2GB	BX	S3 Trio64	—	—	Win 95	Microsoft Office 95 Pro	$999.49	76404
520	166MHz Pentium	desktop	16MB/256MB	1.2GB	optional	SiS 6205	—	—	Win 95	Three year warranty	$1039.25	84434
520MCx	166MHz Pentium	desktop	16MB/256MB	1.6GB	16X Max	SiS 6205	33.6K bps	—	Win 95	16-bit stereo sound	$1327.64	B443B
525CD	166MHz Pentium	mini-tower	16MB/192MB	1.6GB	16X Max	SiS 6205	—	—	Win 95	MS Word and Publisher	$1234.78	B4439
525CDT	166MHz Pentium MMX	mini-tower	16MB/192MB	2.5GB	16X Max	S3 Trio64	—	—	Win 95	Two USB ports	$1489.65	B4440
525MCx	166MHz Pentium MMX	mini-tower	24MB/192MB	2.5GB	16X Max	S3 Trio64	33.6K bps	—	Win 95	16-bit stereo sound	$1549.65	B4443
525CD	200MHz Pentium MMX	mini-tower	24MB/192MB	2.5GB	16X Max	S3 Trio64	—	—	Win 95	Two USB ports	$1588.65	B4444
525MCx	200MHz Pentium MMX	mini-tower	32MB/192MB	3.8GB	16X Max	Matrox Millennium	33.6K bps	—	Win 95	16-bit stereo sound	$1936.70	B4445
HP Vectra VE PC Series 3												
VE3 5/133	133MHz Pentium	desktop	16MB/192MB	1GB	optional	SiS 6205	—	—	Win V3.1/Win 95	64-bit PCI graphics	$1034.82	78238
VE3 5/133	133MHz Pentium	desktop	16MB/192MB	1.6GB	optional	SiS 6205	—	—	Win V3.1/Win 95	64-bit PCI graphics	$999.36	91103
VE3 5/166	166MHz Pentium	desktop	16MB/192MB	1.6GB	optional	SiS 6205	—	—	Win V3.1/Win 95	64-bit PCI graphics	$1038.97	91105
VE3 5/200	200MHz Pentium	desktop	16MB/192MB	1.6GB	optional	SiS 6205	—	—	Win V3.1/Win 95	64-bit PCI graphics	$1048.60	91107
HP Vectra VL PC Series 5												
VL5 5/166	166MHz Pentium	desktop	16MB/192MB	1.6GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1166.30	B5717
VL5 5/166	166MHz Pentium MMX	desktop	16MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1377.09	91115
VL5 5/200	200MHz Pentium	desktop	32MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1449.60	B6511
VL5 5/200	200MHz Pentium MMX	desktop	32MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1598.63	91119
VL5 5/233	233MHz Pentium MMX	desktop	16MB/192MB	2.5GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1598.12	91120
VL5 5/133	133MHz Pentium	mini-tower	16MB/192MB	1.6GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1219.44	B6523
VL5 5/166	166MHz Pentium	mini-tower	16MB/192MB	2.5GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1229.50	B6527
VL5 5/166	166MHz Pentium MMX	mini-tower	16MB/192MB	2.5GB	BX	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1439.22	91121
VL5 5/166	166MHz Pentium	mini-tower	32MB/192MB	2.5GB	BX	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1519.54	B6421
VL5 5/200	200MHz Pentium	mini-tower	16MB/192MB	2.5GB	8X	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1395.28	B4733
VL5 5/233	233MHz Pentium MMX	mini-tower	32MB/192MB	4GB	optional	S3 Trio64	—	—	Win V3.1/Win 95	Two USB ports	$1889.76	91123
Toshiba												
Equium 5160D	166MHz Pentium MMX	desktop	32MB/192MB	2.07GB	12X	2MB ATI 3D RAGE II	—	10/100	Win 3.11/Win 95	USB ports, DMI 2.0	$1418.82	B4248
Equium 5200D	200MHz Pentium MMX	desktop	32MB/192MB	2.38GB	12X	2MB ATI 3D RAGE II	—	10/100	Win 3.11/Win 95	USB ports, DMI 2.0	$1549.64	B4249
Equium 6200D	200MHz Pentium Pro	desktop	32MB/128MB	2.95GB	12X	2MB S3 ViRGE 3D	—	10/100	Win NT V4.0	USB ports, DMI 2.0	$2118.60	B4251
Equium 6200M	200MHz Pentium Pro	mini-tower	32MB/512MB	4.24GB	12X	2MB ATI 3D RAGE II+	—	10/100	Win NT V4.0	USB ports, DMI 2.0	$2479.47	B4252
Equium 6260M	266MHz Pentium II	mini-tower	32MB/256MB	3.73	16X	4MB ATI 3D RAGE II+	—	10/100	Win NT V4.0	USB ports, DMI 2.0	$2569.07	93106
Infinia 7161	166MHz Pentium MMX	mini-tower	32MB/128MB	2.38GB	12X	2MB S3 ViRGE 3D	33.6K bps	—	Win 95	USB ports, SRS 3D sound	$1649.89	B4559
Infinia 7201	200MHz Pentium MMX	mini-tower	32MB/128MB	3GB	12X	2MB S3 ViRGE 3D	33.6K bps	—	Win 95	remote control, TV/FM card	$1989.24	B4560
AST Bravo												
LC 5166	166MHz Pentium	desktop	16MB/384MB	1.6GB	optional	ATI mach64 VT3	—	—	Win 95	Two USB ports	$1006.00	93286
LC 5166M	166MHz MMX Pentium	desktop	16MB/384MB	2GB	optional	ATI mach64 VT3	—	—	Win 95	Two USB ports	$1115.18	93288
LC 5200	200MHz Pentium	desktop	16MB/384MB	2GB	optional	ATI mach64 VT3	—	—	Win 95	Two USB ports	$1137.16	93289
MS 5166	166MHz Pentium	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1625.72	91032
MS 5166	166MHz Pentium	desktop	16MB/256MB	2GB	optional	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1245.78	91034
MS 5166	166MHz Pentium	desktop	32MB/256MB	2GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1487.26	91038
MS 5166M	166MHz MMX Pentium	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1514.69	89552
MS 5166M	166MHz MMX Pentium	desktop	32MB/256MB	2GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1619.87	B9553
MS 2000C/95	200MHz Pentium	desktop	32MB/256MB	2GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1459.06	B9546
MS 2000C/NT	200MHz Pentium	desktop	32MB/256MB	2GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1549.10	B9547
MS 3000C/95	200MHz Pentium	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1487.26	B9549
MS 3000C/NT	200MHz Pentium	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1586.03	B9548
MS 3000C/95	200MHz Pentium	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1564.09	B9550
MS 3000C/NT	200MHz Pentium	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1649.08	B9551
MS 3000C/95	200MHz Pentium MMX	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1779.77	B9573
MS 3000C/NT	200MHz Pentium MMX	mini-tower	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1879.98	B9574
MS 3000C/95	200MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win 95	Two USB ports	$1696.69	91570
MS 3000C/NT	200MHz Pentium MMX	desktop	32MB/256MB	3GB	16X Max	ATI 3D RAGE II	—	—	Win NT V4.0	Two USB ports	$1799.25	91569
MS-T 6200	200MHz Pentium Pro	mini-tower	32MB/128MB	2.5GB	BX	Matrox Millennium	—	—	Win NT V4.0	16-bit stereo sound	$1886.33	76068
LC 6233	233MHz Pentium II	mini-tower	32MB/384MB	2GB	optional	S3 Virge/DX 3D	—	—	Win 95	Two USB ports	$2099.23	B910B
LC 6233	233MHz Pentium II	mini-tower	32MB/384MB	2GB	optional	S3 Virge/DX 3D	—	—	Win NT V4.0	Two USB ports	$2197.23	B9107

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CDW

EVERYTHING you need TO run your business

We picked the premier programs in five essential categories, from accounting and business planning to project and contact management.

EDITED BY MELISSA RIOFRIO

BUSINESS MANAGERS don't turn prematurely gray for nothing. On a typical day, they might juggle budgets, staff and client problems, and project schedules all before lunch.

It's a daunting job, especially for small-business owners, who tend to wear many hats—or even for managers within big businesses, who may lack some resources. But there is help.

You may not be able to afford accounting and human-resources staffs, but you can certainly spare a few hundred dollars (or less) for the latest business management software. We've picked 22 programs in five essential categories: accounting, business planning, contact and personal information management, project management, and human resources.

No software can completely replace a professional in the field, but our Best Buys' terrific features and user-friendly interfaces can handle routine chores very well. Among accounting packages, Peachtree Software's Peachtree Complete Accounting Plus Time and Billing lets a growing company connect multiple users over a network, and Intuit's QuickBooks Pro is a simple solution for smaller businesses. Of the business planners, Jian's BizPlanBuilder Interactive best helps entrepreneurs write professional-caliber plans. We recommend Lotus Organizer 97 for intuitive PIM features, and GoldMine Software's GoldMine 3.2 if you need networkable, full-fledged contact management. Microsoft Project 4.1 is our pick among project managers, and we chose three human-resources Best Buys: Avantos Software's Review Writer for employee evaluations, and KnowledgePoint's Descriptions Now for job descriptions and Policies Now for company manuals. We've also listed the best Web sites for getting more information on a variety of business issues.

Who knows—these applications may just give you a bit more free time to do something really wild. Like go out to lunch. ▶

ILLUSTRATIONS BY MICHAEL KLEIN

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H.R.
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ACCOUNTING
IN

Accounting

BY THERESA W. CAREY

SOUND MONEY management is essential for small businesses, but few have the luxury of hiring an accountant. Luckily, you can do 90 percent of the work yourself with one of the four strong programs reviewed here: BestWare's MYOB Premier, BytePro's Time & Profit 2.0 for Windows, Intuit's QuickBooks Pro 5.0, and Peachtree Complete Accounting Plus Time and Billing. These programs go beyond simple checkbook tracking to offer inventory management, time-and-billing features, financial reports, and customizable forms. They even let you develop a budget, then see how you're doing in comparison to the plan and to last year's performance.

No program can replace a CPA. You'll need someone to check the books and help with taxes. If you still keep receipts in a shoe box, consider a basic package such as Peachtree's One-Write Plus.

In the end, two accounting products here achieved Best Buy status by combining broad appeal and good value. QuickBooks Pro is a great choice if all you need is a single-user package that demands very little financial know-how on your part. If you want lots of accounting features that you can share across a network, Peachtree Complete Plus Time and Billing narrowly edges out MYOB Premier.

MYOB Premier

PRO: Easy to use, good inventory management, subscription-based support includes unlimited upgrades and technical help

CON: No time and billing functions, no per-incident technical support service

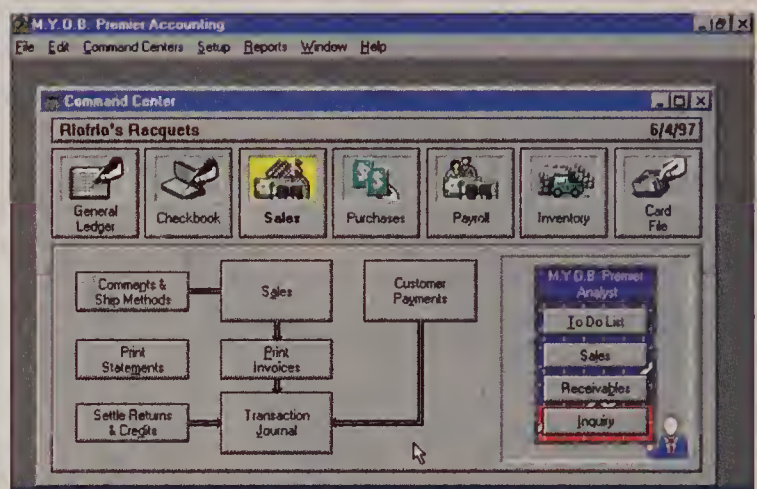
PRICE: Initial license $449; $99.95 per user to add more than three simultaneous users

Are you ready for a commitment? MYOB Premier demands one, but for a reasonable price. This multiuser version of BestWare's flagship MYOB package lacks time and billing, a feature that's available in Peachtree Complete Plus Time and Billing. Otherwise, however, it's full-featured, with many items that are missing from the approachable but less powerful QuickBooks Pro. For instance, it offers back-order processing—crucial for wholesalers and other inventory-based businesses.

As for the commitment part, MYOB Premier charges a yearly subscription for full-service support. With most accounting programs you either can pay a flat fee for a year's worth of phone support, or you can pay for calls and upgrades on an individual basis. However, with MYOB Premier you pay $2495 per year to get unlimited, toll-free help and software upgrades—or you get no support at all after the first six months. This may sound extreme, but it could pay off over time compared to the nickel-and-dime hassle of some support plans.

Despite its comprehensive feature set, MYOB Premier is easy to use even for novices. To navigate, you pick a module from MYOB's Command Center; within each module you can choose individual tasks from a flowchart. Program navigation could be more flexible, though: It's largely mouse oriented, and some screen functions have no keyboard equivalents. Considering that using an accounting package requires so much keyboard data entry, it would be nice to have the option of ignoring the mouse. *BestWare, 800/322-6962, www.bestware.com*

READER SERVICE NO. 647



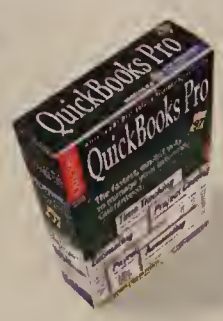
WHEN YOU PICK a module in MYOB Premier, a flowchart appears so you can go straight to the process you need.

Best Buys

HOW MANY challenges do *you* face during a typical workday? The more that get thrown at you, the more you need the right business software. These nine Best Buys can take some of the stress out of everything from day-to-day bookkeeping to making the case for new corporate ventures.

ACCOUNTING

Peachtree Complete Accounting Plus Time and Billing Among multiuser accounting packages, Peachtree's $249 system shines for its customizable reports and new time and billing module.

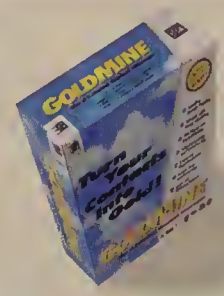


ACCOUNTING

QuickBooks Pro It's a single-user package only, but for small and home-based businesses the $199 QuickBooks is about as easy as accounting ever gets.

BUSINESS PLANNING

BizPlanBuilder Interactive This $99 package's detailed, straightforward template and other resources can take much of the grunt work out of building a compelling business plan.



CONTACT MANAGERS

GoldMine 3.2 for Windows 95/NT 4.0 Need to share schedule, prospect, and customer information with colleagues across a LAN or over the Internet? For $180, GoldMine is a top choice.

Peachtree Complete Accounting Plus Time and Billing

PRO: Lots of features, very customizable

CON: Cramped screens

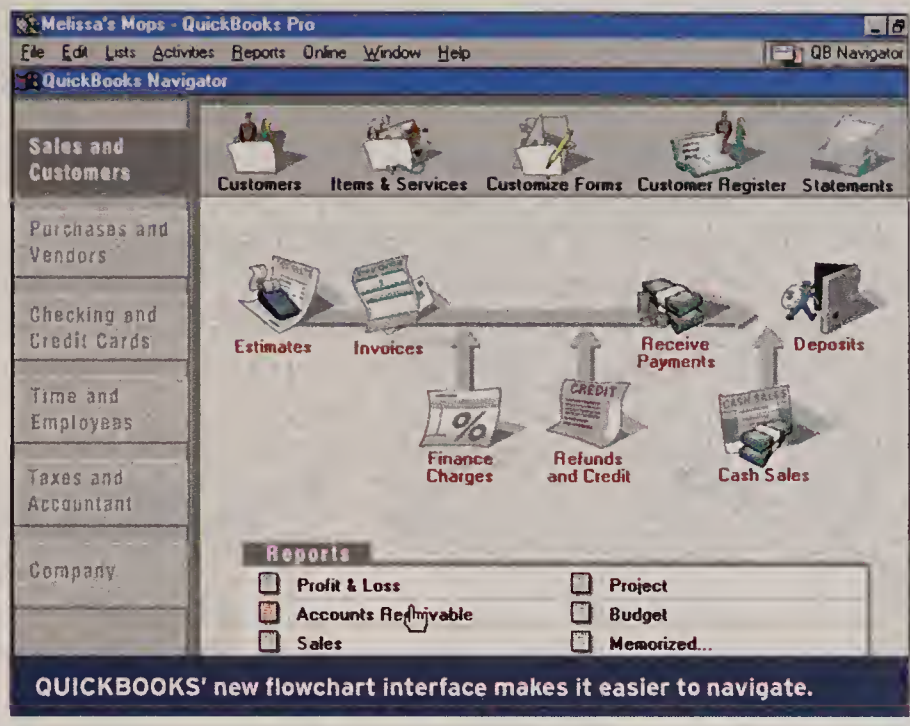
PRICE: $249

Until MYOB Premier came along, Peachtree Complete was the only low-end multiuser accounting package. Both programs are good choices, but Peachtree Complete is our Best Buy pick among multiuser packages, mainly because it's less expensive and includes a time and billing module.

Navigating through the program is easy—you go from tabs on the main screen to flowchart views of each module. However, the charts don't give you access to some functions, such as reports related to time and billing. Also, the densely packed screens could confuse some users.

Service-based businesses that use Peachtree Complete can link employee time cards to both payrolls and invoicing—no more trying to import data from elsewhere or manually rekeying the data. And unlike MYOB Premier's reports, all those in Peachtree Complete can be customized; you can even create groups if you want to print a particular set regularly, such as month-end financial data. An extra-cost module, the $129 Business Internet Suite, helps you set up shop on the Web and then transfer transactions generated on the Web site directly into the accounting program. *Peachtree Software, 800/228-0068, www.peachtree.com*

READER SERVICE NO. 648



QUICKBOOKS' new flowchart interface makes it easier to navigate.

QuickBooks Pro 5.0

PRO: Great remodel of a good entry-level program, simple setup and navigation

CON: Fewer tools than other programs here

PRICE: $199

The new version of QuickBooks Pro looks different from previous ones, but it still fulfills the same need: managing money with a minimum of hassle for small or home-based, service-oriented businesses that have few or no inventory needs.

Installing QuickBooks went flawlessly in our tests. If you opt to install Netscape Navigator, you'll get immediate access to Intuit's Web site for business advice and program updates.

QuickBooks has always avoided accounting lingo whenever possible, and it's even easier to find your way through this version, which switched from a tabbed-folder interface to flowcharts similar to MYOB Premier's. The new Accountant Review lets you continue using the program while a CPA makes data adjustments.

Unlike Peachtree Complete and MYOB Premier, QuickBooks is a single-user package—a drawback for growing businesses (a multiuser version is planned). And Time & Profit will work better if you bill hourly, in part because QuickBooks can't report on hours that have gone unbilled. However, for small, service-based businesses that simply need general accounting, QuickBooks Pro fits just right. *Intuit, 800/446-8848, www.intuit.com*

Time & Profit 2.0 for Windows

PRO: Does a good job of managing a strictly service-based business

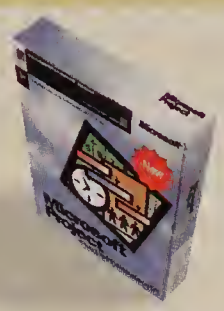
CON: No inventory management, floppy-based installation is clunky

PRICE: single user $179, five-user license $485

BytePro's Time & Profit is a hybrid time-and-billing and accounting program aimed at law firms and other ▶

PIMS

Lotus Organizer 97 This $79 PIM looks so much like a traditional paper planner that even the most faithful of Filofax junkies will be able to make the switch to PC-based time management.

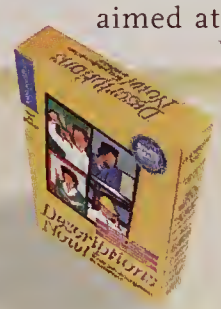


PROJECT MANAGERS

Microsoft Project 4.1 Despite its high $469 price, Project's profusion of wizards and lack of jargon make it a winner for keeping big jobs on time and within budget.

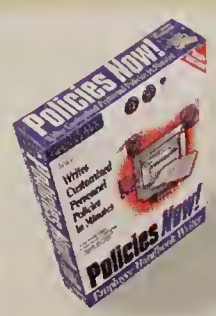
HUMAN RESOURCES

Avantos Review Writer Conducting a thorough and fair employee evaluation is a little less of a challenge with this $49 package's simple interface and good advice.



HUMAN RESOURCES

KnowledgePoint Descriptions Now With its thousands of customizable job descriptions, the $129 Descriptions Now enables you to document job responsibilities without starting from scratch.



HUMAN RESOURCES

KnowledgePoint Policies Now Complete this $129 product's on-screen survey, and it will generate a professional employee manual that you can print out or put on your company's intranet.

businesses that sell services on an hourly basis. It's much less complex than its major competitor, Timeslips—and unlike Timeslips, Time & Profit includes some accounting tools, so you don't have to export billing data to another package. However, since Time & Profit lacks inventory processing, it's not for businesses that sell products as well as services.

Time & Profit's floppy-based setup seems clunky compared to installing from a CD-ROM, but otherwise our installation went smoothly. Law firms will find it especially easy to set up and use, as it uses the American Bar Association task codes.

Using Time & Profit is simple. You can enter clients, jobs, tasks, and employees on the fly, and each timekeeper can maintain a calendar that can be shared across a network. Items on your to-do list can be converted to billing records with a couple of keystrokes. One valuable report displays unbilled time accumulated by employees, so a manager can keep tabs on productivity. For strictly service-based businesses that want to integrate time and billing with accounting, Time & Profit offers enough of both to do the job right. *BytePro, 800/713-5322, www.bytepro.com*

READER SERVICE NO. 649

Top **Accounting** Web Sites

✦ **CPAssociates Seminars, www.cpassoc.com/core.asp** Schedule of nationwide seminars on picking the right accounting program.

✦ **Harcourt Brace Professional Publishing, www.hbpp.com** Publisher's site for news articles, tax-code research, reference and advisory resources, and links for accounting and other business finance topics.

✦ **Quicken Financial Network, www.quicken.com/site_map.html** Omnibus site with news and information on accounting and related financial products, services, and industries.

✦ **Rutgers Accounting Web, www.rutgers.edu/Accounting/raw/main1.htm** Rutgers University accounting department's site references accounting organizations and educational programs.

✦ **Small Business Accountants of America, www.sbaa.com** A nationwide referral service that can match accountants to small businesses.

Business **Planning**

BY MIKE HOGAN

YOU HAVE a great idea that will make millions—but lenders and investors won't buy into it unless you present a good business plan. If you don't have the money to hire a consultant or the time to start from scratch, a business planning program can help.

Every business plan requires certain standard information, such as an exhaustive narrative of your track record, the strategy for your new venture or expansion, and current financial statements and projections. A business planning program assists with gathering data and formatting it for professional results.

Our Best Buy is Jian's thorough yet simple BizPlanBuilder Interactive. Also reviewed: American Institute for Financial Research's Small Business Plan 5.22, Business Resource Software's Plan Write 4.0 and Expert Edition, and Palo Alto Software's Business Plan Pro 2.0.

BizPlanBuilder Interactive

PRO: Template is easy to follow and has plenty of room for quick customization

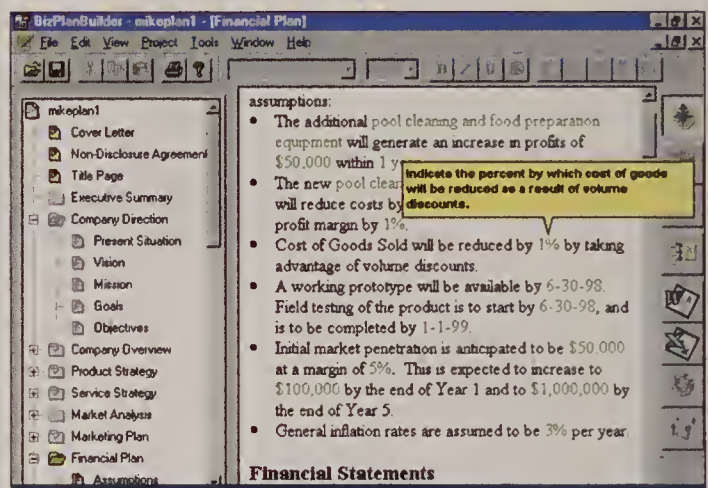
CON: Could use a few more templates

PRICE: $99

Jian's BizPlanBuilder Interactive is our Best Buy because it cuts through the complexity of developing a plan and helps you produce slick-looking results. Its exhaustive template walks you through every step from cover letter to appendix, with plenty of samples. Key information is hot-linked—for example, you type your company name just once to have it appear in 60 places. BizPlanBuilder also offers a better collection of financial tables, ratios, and projections than any competitor.

If templates aren't your style, BizPlanBuilder will guide you through building your own plan from scratch. Jian also maintains a network of advisers on its Web site—attorneys, CPAs, and business consultants—one of whom you can engage to review your work or handle unique situations. Put this product high on your list if you want to start a new business or expand what you already have. *Jian, 800/440-5426, www.jianusa.com*

READER SERVICE NO. 650



BIZPLANBUILDER'S DEFAULT view is a screen full of editable text with color cues showing where to type your information.

Business Plan Pro 2.0

PRO: Flexible interface, a variety of templates

CON: Sample plan text and financials are somewhat spare and not well linked to other areas

PRICE: $99

The text and tables in Palo Alto Software's Business Plan Pro are neither as detailed nor as varied as those in BizPlanBuilder, but this easy-to-use package may do the job for relatively simple businesses.

The flexible interface lets you start from scratch or pick from several customized sample plans. Unlike many planners, it also allows you to pick a model that mixes products and services. You can work on your plan by using a wizard that breaks the process into ten major steps; or you can use a collapsible outline of the plan. However, repeated information isn't hyperlinked, and there's no search-and-replace function, so a revision requires fixing every instance manually. *Palo Alto Software, 800/229-7526, www.palo-alto.com*

READER SERVICE NO. 651

Plan Write 4.0 and Plan Write Expert Edition

PRO: Expert Edition analyzes your draft

CON: No plan templates, Expert Edition is pricey

PRICE: version 4.0 $130, Expert Edition $229 ▶

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– Windows Sources, June 1997

"Tops Norton's Utilities"
– PC Magazine, June 24, 1997

"A winning program"
– PC World, July 1997

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Rebuild & Optimize Registry for max. speed	YES	—
Optimize Hard Drive (N&B is up to 5x faster)	YES	YES
Clean up Hard Drive	YES	YES
Provides Detailed System Info	YES	YES
Emergency Rescue & Recovery	YES	YES
Hardware Diagnostics	YES	DDS only
System Monitor	YES	YES
Crash Recovery	YES	YES
Crash Protection	YES	—
Easy System Configuration	YES	YES
Zip/Unzip files	YES	—
Zip Integrated with file and Hard Drive Cleanup	YES	—
High Security Encryption	YES	—
Security Integrated with File Compression	YES	—
Secure Erase Feature	YES	—
Self Decrypting Files for easy e-mailing	YES	—

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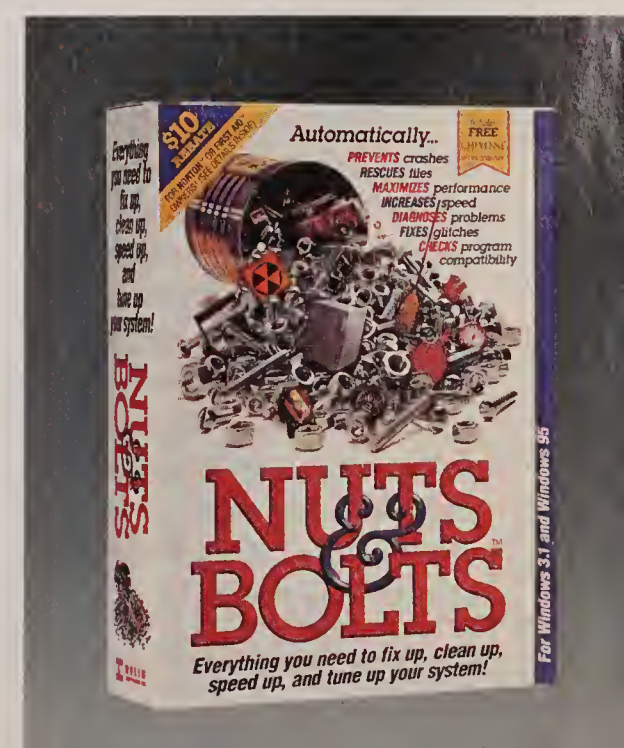

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We can't recommend Plan Write 4.0 or the new Expert Edition because neither offers a customizable sample plan; you have to provide your own text and numbers. The higher-priced Expert Edition does analyze your answers to the interview, audit your plan, and suggest fixes when the numbers don't jibe. But its financial tables and ratios, while varied, aren't as detailed as BizPlanBuilder's. Unless auditing is essential, there's no reason to use a program that gives you less and costs more. *Business Resource Software, 800/423-1228, www.brsinc.com*

READER SERVICE NO. 652

Smart Business Plan 5.22

PRO: Slick interface, plenty of formatting options

CON: Anemic templates

PRICE: $99

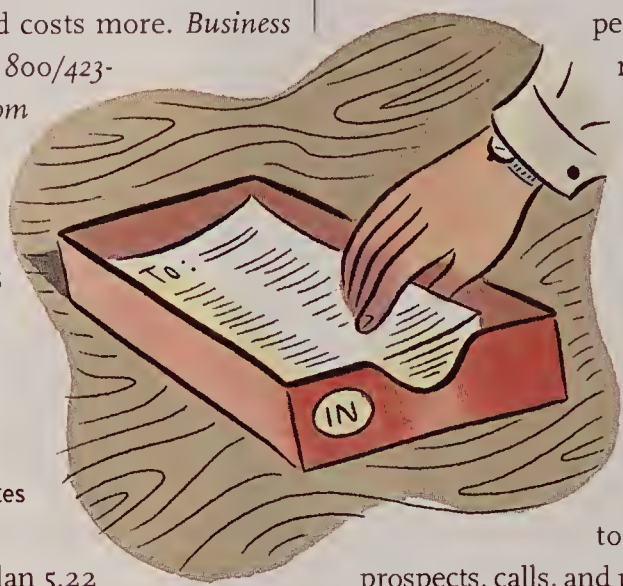
Smart Business Plan 5.22 has a flexible, tabbed-folder interface that's easy to use, and it can handle a business that combines both products and services. Beyond that, however, we couldn't find much of substance. The ad hoc examples are thin, and you must copy them into your plan a page at a time—a clunky approach. Our Best Buy costs the same and offers tons more canned content plus additional and better features. *American Institute for Financial Research, 800/578-9000, www.smartonline.com*

READER SERVICE NO. 653

Contact Managers/**PIMS**

BY MIKE HOGAN

GOOD CONTACTS make your business go round. Fortunately, there has never been a shortage of software to help you handle your schedule and your contacts with Very Important People. These products fall into two general categories: personal information managers and contact managers. A low-cost, easy-to-use PIM like our Best Buy Lotus Organizer 97 ($79) fits the bill if you just need to get a handle on your calendar and address book. But to track customers, prospects, calls, and promises, you need a full-featured contact manager such as GoldMine 3.2 for Windows 95/NT 4.0, our other Best Buy. At $180 it's about twice as expensive as Organizer, but it gives you more ways to link and report on contact information.



Act 3.0 for Windows

PRO: Well designed and powerful

CON: Group tools aren't as good as those in GoldMine, subpar tech support

PRICE: single user $169, five users $845

Among contact managers, Act 3.0 is a close second to GoldMine, our Best Buy. Sales and marketing pros will appreciate the way this package lays out its tools so the right one is always at hand. Act 3.0 is slightly easier to use than GoldMine, and it lets you share contacts, calendars, and to-do lists across a local area network or over an intranet. However, Act still can't beat GoldMine's powerful networked sales management and order-reporting features—important tools for collaborative work.

In addition to the traditional split-screen view, Act offers a spreadsheetlike view that lets you see just a few fields in a whole lot of records. This is helpful when you want to print a simple list of names and phone numbers. It also supports Caller ID, so it can go directly to a caller's contact record.

We had bad luck with Symantec's tech support; we were on hold for a long time (on our dime), and neither support rep we spoke with knew much about Act. *Symantec, 800/441-7234, www.symantec.com*

READER SERVICE NO. 654

Ecco Pro 4.01

PRO: Comprehensive contact and schedule management, great tech support

CON: Difficult to learn—and there's no tutorial

PRICE: $99, five-unit license $450

Are you already superorganized? Do you have a clear vision of the people, projects, and deadlines swirling around you? If so, you might like Ecco Pro. It's powerful and flexible, but not for the faint of mind.

Ecco Pro is a sophisticated tool for groups who work on long-term projects. It uses a complex outline view that handles everything from calendars and phone books to project management exotica such as Gantt charts. Practically any bit of information can be linked to another. For instance, you can attach to a team leader's name the names of people on the team, plus application files, notes, and schedules. But all this power is tough to master, and the program doesn't focus on sales and marketing issues. Phone book fields aren't as detailed as those in Act or GoldMine, and there's no reporting. *NetManage, 425/885-4272, www.netmanage.com*

READER SERVICE NO. 655

GoldMine 3.2 for Windows 95/NT 4.0

PRO: Fullest-featured contact manager for a LAN- or intranet-based workgroup **CON:** No list view, tech support is hard to reach

PRICE: single user $180; five users $671

GoldMine is our Best Buy for workgroups, especially those heavy into sales support and management. It not only provides all the ▶

Top **Business Planning** Web Sites

✦ **Excite Business and Investing Channel, www.excite.com/xdr/Business/** Web search engine subdirectory with links to sites that offer business planning advice, how-to's, and sources of finance.

✦ **Idea Cafe's Financing Your Business, www.ideacafe.com/getmoney/** Offers pages and pages of business financing tips and money sources.

✦ **MoneyHunter, www.moneyhunter.com** Advice, contacts, and business planning templates from *Money Hunt*, a PBS program devoted to entrepreneurial finance.

✦ **The VINE (Venture Information Network for Entrepreneurs), www.thevine.com** An online mall where businesspeople can meet, share information, and find financing, services, and products.

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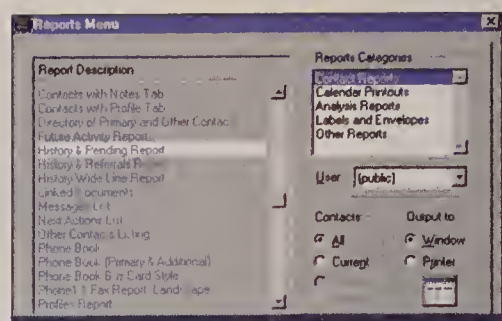
usual record-locking and security options necessary for group use, but it also does the best job of using e-mail and the Web to streamline projects and keep your clients happy. The intuitive interface employs the kind of organization you might have if you kept folders on your desk, but it does not give you Act's list view.



GOLDMINE OFFERS a battery of preformatted reports to track your sales.

The latest version of GoldMine includes a truly rich Internet e-mail program that can hold its own with Eudora. GoldMine can be your de facto intranet server, too: Using special e-mail attachments, far-flung workgroup members can synchronize their contact databases for the price of a local phone call to an Internet service provider. Our only problem was the voice-mail hell you have to endure to get to GoldMine's otherwise solid technical support staff. *GoldMine Software, 800/654-3526, www.goldminesw.com*

READER SERVICE NO. 656

Lotus Organizer 97

PRO: Great general-purpose PIM, users can share information over a LAN

CON: Not suitable for heavy-duty contact tracking,; horrible tech support

PRICE: $79

If you're new to PIMs and dread letting go of your paper planner, Lotus Organizer 97 offers a comfortable transition into PC-based time management. There it is in colorful 3D—a big six-ring binder with tabbed views of your calendar, to-do list, address book, auto-dialer, planner, notepad, and even a handy personal reminder list. It's the familiar Day-Timer look right down to the sound of turning pages.

As an interface, this is all very intuitive and cool, but Organizer is best suited for casual users, not for high-powered salespeople. That's because it doesn't offer sales and telemarketing tools to compete with the ones in Act and GoldMine. Those packages have much more powerful linking features, track calls automatically, and produce group sales reports.

Organizer is so easy to use, though, that it gets our Best Buy recommendation despite some of the worst phone support we've ever encountered. When someone can't explain a product that's as simple as this one—and can't transfer you to somebody who can—it's time for a major staff overhaul. *Lotus Development, 800/343-5414, www.lotus.com/organizer*

READER SERVICE NO. 657

Maximizer 97is

PRO: Good telemarketing package with some Internet-oriented extras

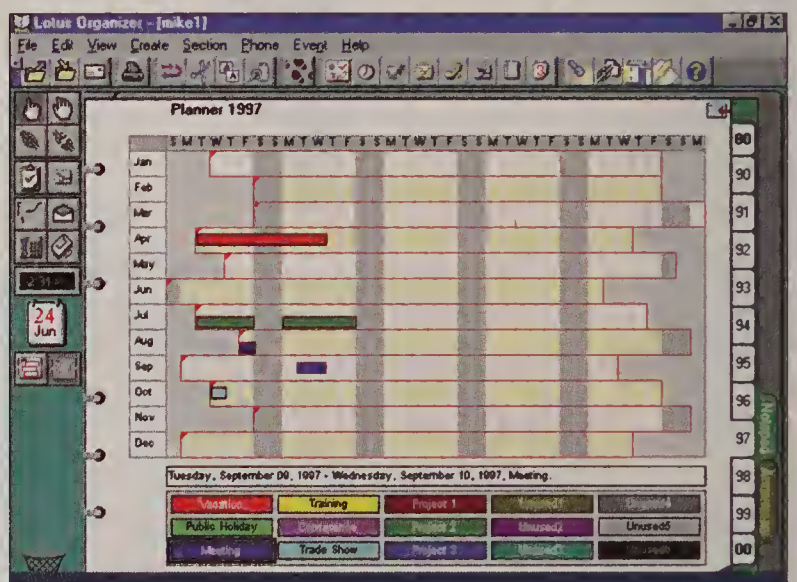
CON: Not very flexible

PRICE: $139

Maximizer 97is is designed with sales professionals and telemarketers in mind. You can launch a call by dragging and dropping a record onto the appropriate icon. Dialog boxes lead you from autodial to annotating and timing the call to scheduling follow-up on your calendar.

Unfortunately, the program's only reporting option shows all contact data, so you can't create focused reports. Worse, you can edit contact information only by using a highly structured three-page form. To Maximizer's credit, its support staffers are knowledgeable, although we had trouble reaching them. *Maximizer Technologies, 800/804-6299, www.maximizer.com*

READER SERVICE NO. 658



CLICK A TAB in Organizer's Planner, and you can mark a block of days for meetings, training, or other categories.

Office 97

Tuned for Small Business

WHEN I THINK of Office 97, the first things that come to mind are that it's a hard drive hog and that those Office Assistants can be annoying. But I have to admit, Office 97's Small Business Edition sweeps those objections aside. Why? Because its Small Business Financial Manager gives small-business managers the analytical tools to play CFO even if they don't have the penthouse office.

Small Business Financial Manager complements your existing accounting package, taking imported data and analyzing it in ways that program can't. For instance, it can detail by month your current and quick cash ratios, your inventory turns, and your return on total assets. You can explore the condition of your payables, receivables, and inventory or find the break-even point and the point of diminishing returns for new products or services. Financial Manager lets you work out answers to questions like, What if I sell assets? What if I add a loan? What if I lease instead of buy?

Importing data from your accounting program is easy, thanks to Small Business Financial Manager's data converters for the top dozen small-business accounting applications. Pop-up help and tutorials teach you the significance of each element as you go along—it's sort of a home-study MBA.

Dozens of other Small Business Edition tools and templates help you run your company: the Avery printing wizard, add-ons that tune Access and other programs for small-business use, even a guide to doing business on the Internet. But Financial Manager makes its presence felt right where you live, on your P&L. **—Mike Hogan**

✦ **WHERE TO BUY:** Office 97 Small Business Edition, $499; Microsoft, 800/426-9400, www.microsoft.com

READER SERVICE NO. 659

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While creating monitors requires a certain proficiency in the sciences, it also helps to know a few things about people. Like that some can effectively manage large MIS departments while fighting an addiction to the ESPN SportsZone web site. Or that others have dinner with a computer more often than with a significant other. Our philosophy of innovation is based on how all of us work, how we live. It's the force behind every monitor we make.

monitors this advanced, a very complex system.

The P110, the first 21" (19.5" viewable) Trinitron monitor in existence, is designed for artistic souls whose ideas are simply too big for a smaller screen. The TFT500 flat panel is extraordinary in its ability to fit neatly into confined spaces, like a corner office rampant with paper piles and golf equipment. The P50 and V70 offer the performance and value you'd expect from the best-selling brand of monitors on earth. They also offer the highest refresh rates in their class. A comforting thought for those of us who associate a mere 40-hour work week with part-time employment.

More and more the world is being seen through a monitor. We invite you to enjoy the view. We're at www.compaq.com/products/monitors/.

COMPAQ

Project **MANAGEMENT**

BY MIKE HECK

ORGANIZING a project by making lists, lists, and more lists is a time-honored but imperfect method of staying on track. Project management software can do much more: It can create charts to keep tabs on progress, calculate the effect of delays, and help manage people, funds, and material as you plan each stage of a project.

Our Best Buy, Microsoft Project, is worth the high price because its wizards speed complex scheduling and planning. SureTrak is a close second; it's jargony, but it allocates resources better.

Microsoft Project 4.1

PRO: Easiest to use, includes essential planning tools, good collaborative features

CON: Lacks sophisticated schedule and resource management functions

PRICE: $469

Although it's the most expensive product here, the $469 Microsoft Project earns a Best Buy. It has nearly everything you'd want in a project manager, and it's very easy to use.

Wizards and cue cards guide you through building typical projects, such as a product launch. Most commands and windows forgo jargon and focus on everyday images, like showing a wall calendar in the Calendar view. In more complex areas, like the Gantt timeline, wizards step in when you try to connect tasks in ways that don't fit your schedule. The Resource view helps you balance team members' assignments, but it has fewer options than SureTrak—if you lose one worker to the flu, the program won't help you substitute someone of equal experience.

Unless you need the more advanced resource and budgeting features of SureTrak, Microsoft Project is a better choice, especially for novices. *Microsoft, 800/426-9400, www.microsoft.com/project*

READER SERVICE NO. 660

Milestones, Etc. 5.0

PRO: Fine charting tool and linking features

CON: No resource management

PRICE: $179

Kidasa's Milestones, Etc. offers basic project management that could work for you if you want scheduling features but need little or no budgeting and resource management. You enter every step of a project into the program's outliner, then click and drag to indicate every step's duration. You can link tasks and see the schedule's duration change as individual task times are modified.

It's too bad that not everything about Milestones, Etc. is so easy. The figures that drive graphs must be entered by hand. There is also no way you can link resources directly to a task. *Kidasa Software, 800/765-0167, www.kidasa.com*

READER SERVICE NO. 661

SureTrak Project Manager 2.0

PRO: Superior scheduling and resource control

CON: Requires some project management experience

PRICE: $399

SureTrak came in a close second behind Microsoft Project. It has some better features, but it's not quite as easy to use.

The program has a front end that goes beyond Microsoft-style wizards to get you thinking about all aspects of a plan, including potential obstacles. However, understanding SureTrak's on-screen forms and menus requires some project management experience.

Unique among its competitors, SureTrak can key tasks for each team member to colored bands on a chart, making it easy to gauge your workload even if the tasks are spread throughout a project. The Spotlight tool highlights tasks, such as everything that must be completed during a certain week. Unless you need SureTrak's more sophisticated resource and budgeting features, however, you're better off with Microsoft Project. *Primavera Systems, 800/973-1335, www.primavera.com*

READER SERVICE NO. 662

TurboProject 1.0

PRO: Inexpensive, handles large jobs well

CON: Jargon heavy, few customizing options, built-in reporting is limited

PRICE: $99

Despite its low price, TurboProject 1.0 is actually the best of the group at handling very large projects. It's also versatile in special situations, such as altering billing rates. Unfortunately, the program's dialog boxes and menus are heavy with technical terms like "lag time." And it's not very customizable; you can't alter the look of Gantt chart bars, and there are few report formats. Version 2.0, which may be available by the time you read this, will offer improved reporting and a tree-style project view, according to the vendor. *IMSI, 800/833-8082, www.imsisoft.com*

READER SERVICE NO. 663

Top **Project Management** Web Sites

- **Center for International Project & Program Management, shaw.iol.ie/~mattewar/CIPPM/** Articles and links to research and news about upcoming events.
- **Project Management Institute, www.pmi.org** A nonprofit association's site, featuring online publications, forums, and education programs.
- **Project Manager's Control Tower, www.4pm.com** Links to some 1500 Web pages, most related to project management. A Virtual Project Office contains templates and similar aids.
- **Project Management World Wide Web Site, www.projectmanagement.com** Offers downloadable utilities, a help area, and links to other Web resources.
- **ProjectNet, www.projectnet.co.uk** Has news, utilities, and demos, and a directory of training resources, software vendors, and consultants.
- **WWW.Project Management Forum, www.synapse.net/~loday/PMForum/** Sponsors live events and promotes project management standards, including certification programs.

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Circle 87 on reader service card

Human RESOURCES

BY THERESA W. CAREY

HUMAN RESOURCE issues may be the thorniest concerns a manager faces. None of the programs here can guard against every staff problem, but they can greatly simplify writing job descriptions, personnel manuals, and employee reviews. Although they're designed to be easy enough for nonprofessionals, even HR specialists will welcome timesaving features like on-screen interviews that generate text based on your responses.

Three programs we reviewed are Best Buys: KnowledgePoint's Descriptions Now 3.01, for job descriptions; the same company's Policies Now 5.02, for employee manuals; and Avantos's Review Writer 3.0, for employee evaluations.

Avantos Review Writer 3.0 for Windows

PRO: Well-designed program guides you step by step through creating a review

CON: Sample text sounds unnatural

PRICE: $49

Review Writer earns a Best Buy because it helps you write a complete employee performance review; and unlike Performance Now, it can audit your work for problems. Using the QuickBuild feature, you can rapidly rate an employee for analytical thinking, written communications, and other factors. The program then provides canned text that fits your assessments. Indeed, this text fits so well, you may let it enter your document without revision—which could make for a slightly impersonal report.

Review Writer's charm is that it's part consultant: It checks your document for completeness and audits the text for possible legal ramifications before they cause trouble. *Avantos Performance Systems, 800/282-6867, www.avantos.com*

READER SERVICE NO. 664

Descriptions Now 3.01

PRO: Easy to use, lots of job descriptions

CON: Can't print an org chart based on the reporting structure

PRICE: $129

Descriptions Now—available separately or in a $269 suite that also includes KnowledgePoint's Performance Now and Policies Now—lets you easily create job descriptions for your company, drawing from a database of thousands. You select a title, then customize the text using the built-in word processor. You can also establish a reporting structure (something Review Writer doesn't allow).

KnowledgePoint also offers its entire job description database on the Internet (www.jobdescription.com) at $7.95 per description—a great option if you need one pronto and don't want to learn a whole new program. *KnowledgePoint, 800/727-1133, www.knowledgepoint.com*

READER SERVICE NO. 665

EmployeeManualMaker 3.0

PRO: Well-done documents, helpful user guide

CON: Must export text to a word processor

PRICE: $139

Jian's EmployeeManualMaker is a collection of manual templates that you open in your word processor, then edit to your specifications. Unlike Policies Now, this package doesn't guide you through putting the manual together through an interview, nor does it generate a table of contents or an index. While it contains well-worded and legally sound documents, customizing the package takes work. Even a professional HR manager wouldn't want to hassle with these templates when Policies Now does the same job much more smoothly. *Jian, 415/254-5600, www.jianusa.com*

READER SERVICE NO. 666

Performance Now 3.02

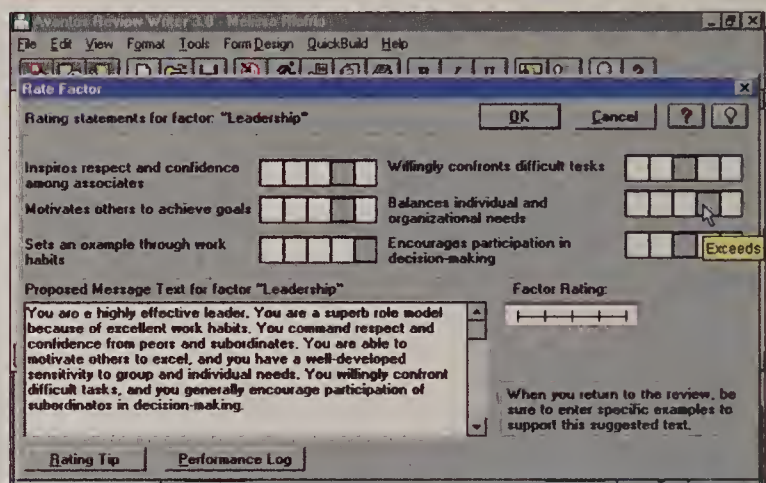
PRO: Builds an evaluation quickly and elegantly

CON: Template customizing is a pricey option

PRICE: Standard edition (single user) $129

Performance Now 3.02 lets you quickly write employee evaluations based on Description Now's job descriptions. Using the description's criteria, you rank an employee for a variety of tasks and characteristics. The program then inserts general text that reflects your ratings, which you can easily edit. A $995 add-on module lets you customize the templates with specific wording. *KnowledgePoint, 800/727-1133, www.knowledgepoint.com*

READER SERVICE NO.667



REVIEW WRITER'S QUICKBUILD feature helps you develop document content.

Policies Now 5.02

PRO: Builds manual via easy interview

CON: None

PRICE: $129

Policies Now offers a better way to develop an HR manual than EmployeeManualMaker's templates. You answer questions about your company by clicking buttons. When you finish the survey, you're awarded with a professionally worded policy statement, all the necessary manual components, and a table of contents and an index. You can edit the content or the index terms, and even publish the manual on an intranet. *KnowledgePoint, 800/727-1133, www.knowledgepoint.com*

READER SERVICE NO. 746

Theresa W. Carey, Mike Heck, and Mike Hogan are freelance writers, and Melissa Riofrio is an associate editor for PC World.

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Iomega 6-pack of 100MB Zip cartridges	$99
Iomega 3-pack of 100MB Zip cartridges	$49
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APC Smart-UPS 700 with PowerChute plus software	$389
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[1] Requires SCSI host adapter
[2] Upgrade from system with standard Micron 17" 700FCx (16" display) color monitor
[3] Upgrade from systems with standard 64-bit 4MB video card
[4] 1st year on-site service is available in the United States and in limited areas in Canada from third-party service provider per customer's agreement with provider
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Unfortunately, strange glitches in 3D games are typical of some of the latest graphics boards on the market. Every new board promises to blow you away with the coolest, fastest 3D images you've ever seen—but don't believe it. Based on our evaluation of a batch of graphics boards after ▶

by Brad **GRIMES**

ILLUSTRATIONS BY GORDON STUDER

putting them through our new 3D and multimedia tests, we can say that few boards deliver 3D that's as impressive as the vendors promise. We found big differences in the way graphics boards handle video, too. So if you're considering upgrading your board just for these hot new graphics capabilities, beware.

But if all you want is to make sure the board that comes in your new PC is good for business applications like Excel, you're in luck. Our tests showed that just about any board is fine for basic 2D work, particularly at typical resolutions such as 800 by 600. The only significant speed differences you'll find in business applications occur at higher resolutions such as 1280 by 1024. When we tested at this resolution, the fastest graphics board (the Matrox Mystique 220), was 9 percent faster than the slowest board (the Creative Labs' Graphics Blaster 3D, which didn't make our Top 10 chart).

The real truth is that no one graphics board can do it all well—zoom around virtual worlds, play movies, *and* help you get your work done quickly. Some boards, like the Hercules Stingray 128/3D, have great-looking 3D games, but jerky video. On the other end of the spectrum, the Matrox Mystique 220 has the fastest 2D performance, but Direct 3D games look terrible. When you go to pick your graphics board, you're going to have to decide what you most want it to do.

Best BUYS

OUR REVAMPED tests revealed two new Best Buys: ATI's $219 3D Pro Turbo PC2TV and Diamond's $170 Stealth 3D 3000. These two cards do the best job of handling a wide range of applications, from standard business applications to virtual reality. They're not tops at every single type of graphics application, but all in all, they're the best you can find right now for both work and play.

The 3D Pro Turbo is particularly powerful since it has 8MB of SGRAM. It has strong performance in several different areas, including 2D, but it has mediocre AVI video playback. It also has TV-out capabilities. The Stealth 3D 3000 has excellent 2D performance and did well in two of our three subjective game tests. Still, it was one of several boards that botched Fox Interactive's Independence Day game.

TEST-DRIVING GRAPHICS CARDS

FOR THIS expanded version of our monthly Top 10 Graphics Boards, we retested 16 boards from previous Top 10s, priced from $100 to $399. (No new boards were available for testing; for information about beta boards we saw, see "Coming Right Up: Tomorrow's 3D.") In addition to evaluating their installation, software, documentation, support, and performance in business applications, we added challenging new 3D and multimedia tests. You can see the results from these tests in two new scores on this month's Top 10 Graphics Boards chart.

To come up with a 3D score for each board, we conducted frame-rate and subjective tests. Our two frame-rate tests told

GRAPHICS BOARDS — FEATURES COMPARISON

	BOARDS	BASICS: Street price (6/2/97)	2D graphics chip	Separate 3D chip	Installed/ maximum video RAM	Video RAM type	RAMDAC speed (MHz)	Maximum refresh rate at 1024 by 768 (Hz)
1	ATI 3D Pro Turbo PC2TV*	$219	ATI Rage II	○	8/8	SGRAM	220	150
2	Diamond Stealth 3D 3000*	$170	S3 Virge/VX	○	4/4	VRAM	220	120
3	ATI 3D Xpression+ PC2TV	$129	ATI Rage II	○	4/4	SGRAM	170	150
4	STB Nitro 3D	$149	S3 Virge/GX	○	4/4	EDO DRAM	170	120
5	Diamond Stealth 3D 2000 Pro	$135	S3 Virge/DX	○	4/4	EDO DRAM	170	100
6	Hercules Terminator 3D/DX	$149	S3 Virge/DX	○	4/4	EDO DRAM	170	120
7	STB Velocity 3D	$199	S3 Virge/VX	○	4/8	EDO VRAM	220	120
8	Matrox Mystique 220	$179	Matrox MGA-1164SG	○	4/8	SGRAM	220	140
9	Hercules Stingray 128/3D	$249	Alliance ProMotion-AT3D	●[1]	4/4	EDO DRAM	180	120
10	Number NineFX Reality 772	$279	S3 Virge/VX	○	4/4	VRAM	220	150

* Best Buy See Top 10 chart, page 289. ● Yes ○ No

[1] 3Dfx Voodoo Rush.

us how smooth and fast a board could run 3D. One test, called Tmark, measured the frame rate on a popular 3D shoot-'em-up, Eidos Interactive's Terracide; another gauged the frame rate of a VRML-based wooden desk as we moved it through 3D space. We also conducted subjective tests on Terracide and two other 3D games, Fox Interactive's Independence Day and Microsoft's Monster Truck Madness. Two staffers took each game for a spin and examined it for realistic-looking 3D graphics.

For our new multimedia score, we kept our old frame-rate test of an AVI video clip running at full-screen, and added two tests that challenge a board's ability to handle animation. We used a programmed script to time how quickly a board could create and run a Microsoft PowerPoint presentation containing several animated text transitions. We then measured frame rates while running a Macromedia Director file containing animations including bouncing balls and spinning globes.

We also expanded our PC WorldBench business application tests by adding a higher resolution. We now test all boards at a resolution of 1280 by 1024 (in addition to 800 by 600 and 1024 by 768).

What did we discover? Among other things, we found that despite the hype, today's 3D is a mixed bag. Some works, some doesn't. A lot can be predicted by the chip a board uses. (For more information on chips, see PC World Online, www.pcworld.com/oct97/graphics.) Most of the boards with S3's popular Virge chip, for example, had driver bugs that made some games virtually unplayable. These boards couldn't do alpha blending correctly, which makes textures translucent. As a result, laser fire and explosions in Terracide were reduced to black boxes. Diamond sent us a fix for its boards' alpha-blending problem; most of the other vendors say they will have a fix by the time you read this.

The best overall gaming board we tested was the Hercules Stingray 128/3D, in ninth place. It gave us the smoothest VRML and 3D game play and the best-looking 3D images of any of the graphics boards that made the chart. The Stingray owes its fine 3D performance to a separate 3D chip and a separate bank of ▶

Coming **Right Up:** Tomorrow's **3D**

SOME NOTEWORTHY 3D boards weren't finished in time for this review, but they should be available by the time you read this. Two boards we saw—one from STB and one from Diamond, both of which are based on a new chip from nVidia—really blew us away. When we tested a beta of STB's Velocity 128 3D, we found that it was fast in 2D and multimedia programs, and its 3D quality was equivalent to that of the Hercules Stingray 128/3D. The best part: It costs only $199. We weren't able to test Diamond's Viper V330, but we were impressed with its 3D quality in a demonstration.

The other important board we saw is the Number Nine Revolution 3D. A next-generation Imagine 128 card, the Revolution 3D includes a lot of 3D gaming features that weren't part of the Imagine 128 line, like filtering. See *New Products* in this issue for the latest on the Revolution 3D.

CLASSIC IMAGES: Boards based on the new nVidia chip can display richly textured graphics, as in this museum image.

VIDEO/3D										USABILITY		
X interpolation/ Y interpolation	TV out	Texture mapping	Separate texture RAM	Perspective correct	3D filtering	Fogging	MIP mapping	Alpha blending	OpenGL drivers	Installation	Documentation	Software utilities
●/●	●	●	○	●	●	●	●	●	○	outstanding	very good	outstanding
●/●	○	●	○	●	●	●	●	●	●	outstanding	good	very good
●/●	●	●	○	●	●	●	●	●	○	outstanding	very good	outstanding
●/●	○	●	○	●	●	●	●	●	○	outstanding	good	good
●/●	●	●	○	●	●	●	●	●	●	outstanding	good	very good
●/●	○	●	○	●	●	●	●	●	○	outstanding	fair	very good
●/●	○	●	○	●	●	●	●	●	○	outstanding	good	good
●/●	○	●	○	●	○	○	●	●	●	outstanding	good	very good
●/●	○	●	●	●	●	●	●	●	○	outstanding	fair	very good
●/●	○	●	○	●	●	●	●	●	○	fair	very good	good

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memory that helps move bit-mapped textures (such as wood) onto 3D scenes more quickly.

Are you looking for a board that will make your multimedia presentations look good? Our number one Best Buy, the ATI 3D Pro Turbo PC2TV with 8MB of SGRAM, was the fastest at creating and running our PowerPoint presentation. How about our Macromedia Director animation test? Scores for this test were bunched, but the number two Best Buy, Diamond's Stealth 3D 3000, lead by a hair. Fewer boards did as well when running AVI video. Six of the 16 graphics boards tested—including the number one ATI 3D Pro Turbo—dropped so many frames that the video was choppy. But several of the boards, including the Diamond Stealth 3D 3000, played our clip flawlessly at a full 30 frames per second.

FOLLOW THE BOUNCING BALL: Our Macromedia Director test measured a board's ability to run multimedia smoothly.

FUTURE GRAPHICS

A TECHNOLOGY YOU CAN EXPECT to see on the horizon is the Accelerated Graphics Port, a new system bus that links a graphics board directly to your PC's main memory. The direct link is expected to help graphics boards move large texture maps onto your screen more quickly, giving you smoother game play. AGP-compliant PCs and graphics boards should appear on store shelves in early 1998.

When you buy a new 3D board, also check to see if it comes with OpenGL drivers. OpenGL is an application programming interface that software developers might use more because Microsoft's Direct3D API has been disappointing. Direct3D was supposed to allow any PC to run any 3D software, but some developers have found it difficult to work with. A few graphics boards in our Top 10 chart, like the number two Diamond Stealth 3D 3000, come with OpenGL drivers.

It's clear that graphics boards have a long way to go before 3D, video, and animation look as good as the business applications you use most. What's more, as 3D technology becomes more advanced, it will be up to software developers to design good-looking, high-quality programs that really take advantage of it. Until then, you'll have to determine which type of graphics is most important to you and buy your board accordingly. ▶

TOP 10 GRAPHICS BOARDS — TEST REPORT

	BOARDS	3D: Slower–Faster	Terracide quality	Monster Truck Madness quality	Independence Day quality	Multimedia: Slower–Faster	PowerPoint time at 1280 by 1024 (seconds)[1]	PC WorldBench: Graphics score at 800 by 600[1]
1	ATI 3D Pro Turbo PC2TV*		good	good	good		249	193
2	Diamond Stealth 3D 3000*		outstanding	outstanding	poor		267	194
3	ATI 3D Xpression+ PC2TV		fair	fair	good		278	188
4	STB Nitro 3D		poor	fair	fair		278	195
5	Diamond Stealth 3D 2000 Pro		good	good	poor		261	195
6	Hercules Terminator 3D/DX		poor	good	poor		272	190
7	STB Velocity 3D		poor	fair	good		275	191
8	Matrox Mystique 220		fair	fair	poor		272	192
9	Hercules Stingray 128/3D		outstanding	good	good		278	187
10	Number NineFX Reality 772		poor	good	fair		268	193

*Best Buy — Frames per second 0 20 40 60 — Frames per second 0 30 60 90

VRML test — Tmark 3D game test — Macromedia Director test — AVI video playback test

[1]We run PC WorldBench and PowerPoint tests at three resolutions but report only the resolution that has the greatest range.

HOW WE TEST All tests were performed under Windows 95 OSR2 on a Dell Dimension XPS P133c with 32MB of EDO DRAM and 256K of pipeline-burst secondary cache. If a board's install program did not correctly install the most current version of DirectX, we used DirectX 3.0. We set the refresh rate to 75 Hz where possible; tests run at 1280 by 1024 resolution were run at 60 Hz. We tested each board as supplied by the manufacturer using PC WorldBench 1.0, plus a separate script for Microsoft PowerPoint, at 800 by 600 and 16.8 million colors, 1024 by 768 and 65,536 colors, and 1280 by 1024 and 65,536 colors. We ran the Macromedia Director test at 800 by 600 and 65,536 colors. We ran the AVI video playback test using Microsoft ActiveMovie at 800 by 600 and 16.8 million colors and received CPU usage information from System Monitor. We ran the VRML test from the hard drive using Netscape Navigator with the VREAM VRML plug-in at 800 by 600 and 65,536 colors. The Tmark test was created by Eidos, the developer of Terracide, to determine frame rates in that game. Subjective evaluations of 3D game quality were done on Terracide, Microsoft's Monster Truck Madness, and Fox Interactive's Independence Day, all of which we ran at 640 by 480 and 65,536 colors.

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Dual Processor Capable, RAID Capable

Common features listed above plus:
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- 2GB Ultra-Wide SCSI-3 Hard Drive (27GB Max)
- 8X SCSI CD-ROM Drive
- MS Windows NT Server 4.0 (10 Client Access Licenses)
- 6 Drive Bays: 3 Hard Drive, 3 Removable Media
- 6 Expansion Slots: 3 PCI, 3 EISA

★ *APC Smart-UPS 700w Power Supply, add $399.*

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- MS Office 97 Small Business Edition

★ *2nd Lithium Ion Battery, add $199.*
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★ *3Com Lan+ 33.6 Modem PC Card, add $299.*
★ *Dell Latitude LM Port Replicator, add $159.*

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Business Lease: $141/Mo.
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DELL LATITUDE LM M166ST
166MHz PENTIUM PROCESSOR W/MMX

Common features listed above plus:
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- 40MB EDO RAM (72MB Max)
- 2.1GB Hard Drive
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- MS Office 97 Small Business Edition

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★ *2nd Lithium Ion Battery, add $199.*
★ *Leather Carrying Case, add $99.*

$3499‡

Business Lease: $123/Mo.
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DELL LATITUDE LM M166ST
166MHz PENTIUM PROCESSOR W/MMX

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1 ATI 3D PRO TURBO PC2TV

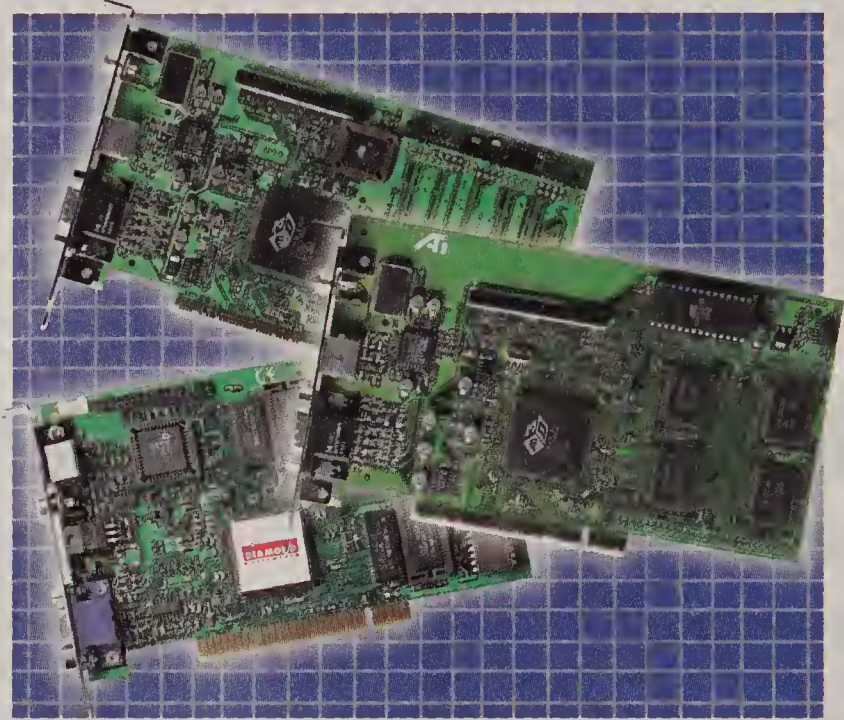
PRO: Outstanding overall multimedia performance, good 3D.

CON: Mediocre AVI playback, no toll-free support.

VALUE: This is the Best Buy to get if you're big into graphics.

The ATI Pro Turbo PC2TV is one of only three boards on the chart to top $200, but when you consider that you get 8MB of SGRAM, it's a bargain—especially for graphics professionals. When it comes to graphically intense multimedia and 3D programs, the extra power on this board will give you a boost. And if you're running desktop publishing or image editing programs at very high resolutions, this is the board for you. To top it all off, the 3D Pro Turbo can hook up to your TV.

The 3D Pro Turbo gets our highest multimedia score thanks to blazingly fast performance in our PowerPoint tests—especially at resolutions above 800 by 600. It didn't have the highest quality or fastest overall 3D performance that we've seen, but it definitely held its own in our 3D tests. The board's performance in business programs (represented by our PC WorldBench test) was strong, but no better than less expensive boards on the chart. And if you play video clips a lot, be warned: ATI's 3D Pro Turbo slogged through our AVI video clip at a choppy 10.5 frames per second.



TV TIME: The ATI 3D Pro Turbo PC2TV, ATI 3D Xpression+, and Diamond Stealth 3D 2000 Pro can all hook up to your TV.

Besides high-quality utilities to change graphics settings, the 3D Pro Turbo comes with some nice software: Macromedia's Extreme 3D, for professional-level 3D modeling and animation; MGI's 3Dvision, for adding 3D objects to business documents and presentations; and MGI's PhotoSuite, for photo editing. Overall, ATI's 3D Pro Turbo PC2TV is a powerful bundle that's a steal at $219. *ATI, 905/882-2600, www.atitech.com.*

READER SERVICE NO. 601

2 DIAMOND STEALTH 3D 3000

PRO: Fast 2D performance, good price.

CON: A driver bug caused a problem in one 3D game; no toll-free phone support, slow in 3D frame-rate tests.

VALUE: Great all-around board.

Our second-place graphics card gets strong marks across the board—the Diamond Stealth 3D 3000 cranked through our PC WorldBench test suite, easily handled our Macromedia Director test, and even played two of our three 3D games with stunning quality. Because the board uses VRAM, it can maintain steady refresh rates at high resolutions—and $170 is a bargain for a board with this type of RAM.

The Stealth 3D 3000 got outstanding ratings in subjective tests with the 3D games Monster Truck Madness and Terracide. It also ran our AVI video test flawlessly at 30 fps. The main reason its 3D score is only adequate: The board turned in one of the lowest frame rates in our VRML and 3D game tests. In addition, because of a driver bug, the Independence Day game looked more like a black-and-white architectural design than a game we'd like to play. Diamond says it is fixing the problem.

The Stealth 3D 3000 comes with intuitive graphics utilities, but it's currently missing some useful tools, specifically virtual desktop, which helps you move around the screen when an image is larger than the screen itself, and zoom, which allows you to move in on particular sections of an on-screen image. Diamond says these capabilities will be added to the board's InControl tools by the time you read this. Overall, the Stealth 3D 3000 is a great package, with an easy setup program and weekend tech support. If you plan to edit images or publish documents in addition to tasks like word processing, this is the board for you. *Diamond Multimedia, 800/468-5846, www.diamondmm.com.*

READER SERVICE NO. 602

3 ATI 3D XPRESSION+ PC2TV

PRO: Good 2D, nice bargain.

CON: No toll-free support, mediocre AVI video playback.

VALUE: At this low price, you can't find a more complete package.

At just $129, the ATI 3D Xpression+ PC2TV is the least-expensive board on the chart. A slower sibling of the number one 3D Pro Turbo PC2TV, this board is good for users on a budget who work mainly with business apps but also want to dabble in 3D and display PC images on a TV.

It's not the fastest performer, but the 3D Xpression+ PC2TV consistently scored well in our PC WorldBench tests, especially at a resolution of 1024 by 768. Its 3D quality is solid if not spectacular: Images looked okay and frame rates were average. And like its first-place sibling,the 3D Xpression+ PC2TV connects to a TV if you want to browse the Web, play games, or do presentations on a television screen.

Our lone disappointment came in AVI video playback. ATI has done a good job over the years of creating the best video images, with crisp, smooth edges. But recently we've found frame rates for all the ATI boards we've tested to be below average. At just 10.7 fps, full-screen video clips look jerky when played with the 3D Xpression+. *ATI, 905/882-2600, www.atitech.com.*

READER SERVICE NO. 603

4 STB NITRO 3D

PRO: Inexpensive, fast 2D, toll-free support, lifetime warranty.

CON: So-so game play, driver bug caused a problem in one 3D game.

VALUE: Great in 2D but merely adequate in 3D.

Get the $149 STB Nitro 3D if you want speedy performance in business programs, but think twice if you're a gamer. The ▶

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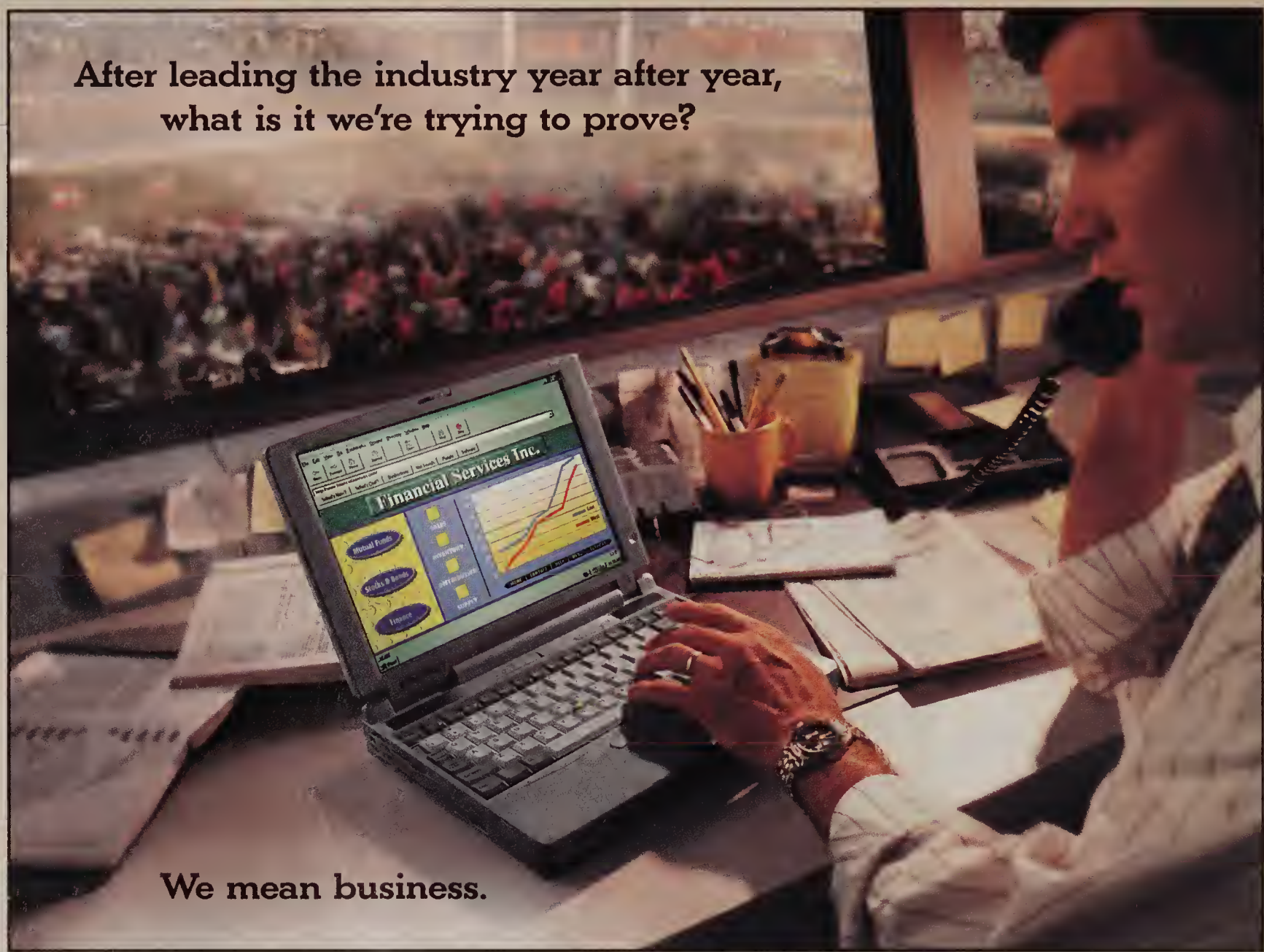

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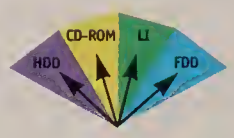

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Circle 215 on reader service card

Nitro 3D consistently scored at the head of the pack in our PC WorldBench tests at all resolutions. In addition, this board generated a perfect 30 frames per second in our AVI video playback test. But the STB board just isn't able to handle 3D games: Game play in Monster Truck Madness and Independence Day was only fair, and it received a poor rating in Terracide because of a driver bug that caused explosions to be surrounded by black boxes (a new driver should be available by the time you read this).

STB is one of only two vendors on the chart to offer toll-free phone support (the other is Hercules)—a nice plus. But if you want your graphics board to play 3D games, no amount of toll-free support will help: This board's 3D is just not top quality. *STB, 888/234-8750, www.stb.com.*

READER SERVICE NO. 604

5 DIAMOND STEALTH 3D 2000 PRO

PRO: Fastest 2D, inexpensive, strong multimedia board.

CON: A driver bug caused a problem in one 3D game.

VALUE: Except for bug, an ideal entry-level board.

The $135 Diamond Stealth 3D 2000 Pro is nearly as good as the boards ranking above it on the Top 10. This board is not ▶

The ABCs of Graphics

THE MORE YOU know about graphics board terminology, the better equipped you'll be to pick the board that's right for you. Here's a selection of terms to keep in mind:

GRAPHICS BOARDS

Color depth. Describes how many colors your graphics card can display at one time: 8-bit color depth shows 256 colors; 16-bit color depth shows 65,536 colors; and 24-bit color depth shows over 16 million colors.

Dual-ported memory. Dual-ported memory is RAM with front and back doors. Graphics data can come in the front and then directly out the back for extra speed. VRAM and WRAM are both dual-ported. (EDO VRAM is a faster form of VRAM.)

EDO DRAM. This is today's plain-vanilla memory. When you're working in business programs, EDO DRAM will give you fine performance, as long as your card has a good 2D chip.

EDO VRAM. See *dual-ported memory.*

RAMDAC. The RAM digital-to-analog converter takes the digital information your PC understands and turns it into analog data that your monitor can display. The faster it works, the higher your refresh rates.

Refresh rate. The number of times per second that the screen is redrawn. Refresh rates below 75 Hz cause noticeable flicker and can strain your eyes.

SGRAM. See *synchronous memory.*

Synchronous memory. This type of memory is synchronized to work at the same speed as the system bus, which theoretically doubles the speed of your graphics. Its two flavors, SDRAM and SGRAM, are essentially the same, except that SGRAM has some features that specifically enhance graphics.

Video interpolation. When you enlarge a video window, the edges of images become jagged unless your graphics card uses interpolation. You want a card that interpolates on both the X and Y axes.

VRAM: See *dual-ported memory.*

3D SOFTWARE

API (application programming interface). When talking about 3D, the API is the software that lets a 3D program communicate with a 3D graphics board. In order for a 3D board to speed up a 3D game, the game has to be written with an API that the board supports.

Direct3D. Microsoft's Direct3D API is supposed to be the standard that all 3D software and boards will support. Direct3D has had performance problems, however, so game makers often use APIs that are specific to certain 3D boards.

OpenGL. A specialized API, used mostly in high-end CAD software. Software developers are starting to consider using OpenGL, rather than Direct3D, as the API for development.

3D IMAGE TECHNOLOGIES

Alpha blending. A way of mixing two overlapping texture maps so that one looks transparent. Take the example of laser beam fire on a green wall. The image of the laser beam is surrounded by a black box. In order for the laser beam to look realistic, the black needs to be removed and the green in the wall must be blended with the color of the beam.

Filtering. Eliminates blockiness in 3D images.

Fogging. Blends a 3D object with a fixed color as it moves farther away, making it look like it's disappearing into or appearing out of fog or darkness.

MIP mapping. Stores several sizes of a texture map in order to fit the images on objects of varying size. This is helpful when you're moving toward a texture-mapped object: Without MIP mapping, the edges of a texture-mapped object will start to flicker—or sparkle—as the 3D chip tries to stretch or condense the texture map to fit the object. With MIP mapping, there's less stretching because the chip can throw larger or smaller textures onto the object quickly.

Perspective correct. Makes texture-mapped 3D objects look realistic from different angles and distances.

Texture mapping. Puts a bit map onto a 3D surface to make the object look more realistic. For instance, in Microsoft's Monster Truck Madness, the graphics board continuously throws a bit map of sand onto the dunes as you move around the scene, making the sand dunes look more realistic.

ADDING A FEEL OF TEXTURE: Without texture-mapped images (on the right), 3D scenes look more like black and white drawings.

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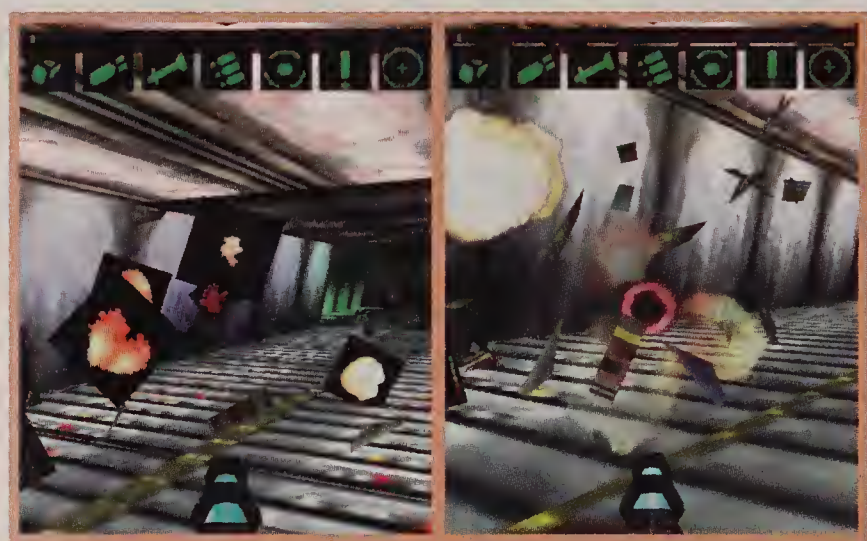
Circle 234 on reader service card

as powerful as the number two Best Buy, the Stealth 3D 3000. That's because the Stealth 3D 2000 Pro uses slower, single-ported EDO DRAM, which can't manipulate graphics as quickly as the VRAM in the Stealth 3D 3000. Still, in everyday business programs like those used in PC WorldBench, the Stealth 3D 2000 Pro is a powerhouse. The Stealth 3D 2000 Pro was the best performer across all three resolutions at which we tested the boards. And as with both the ATI boards on the chart, you can connect the Stealth 3D 2000 Pro to a television.

The Stealth 3D 2000 Pro does very well in multimedia: It ran our AVI video test at a perfect 30 fps. Results of the Director animation test were top of the line, and performance in the PowerPoint test was respectable. We liked how Monster Truck Madness and Terracide looked with the Stealth 3D 2000 Pro, but as with the Stealth 3D 3000, Independence Day suffered from a driver bug.



SHOOTING BLANKS: Without proper alpha blending, the laser fire and explosions on the left aren't rendered correctly.

Like the Stealth 3D 3000, this board lacks virtual desktop and zoom utilities. But Diamond promises that these tools will be incorporated into its InControl tools by the time you read this. *Diamond Multimedia, 800/468-5846, www.diamondmm.com.*

READER SERVICE NO. 605

6 HERCULES TERMINATOR 3D/DX

PRO: Speedy in multimedia apps, affordable, toll-free support.

CON: Mediocre 3D quality, only fair documentation, a driver bug caused a problem in one 3D game.

VALUE: A good buy—unless you play lots of 3D games.

Hercules' $149 Terminator 3D/DX is much like the Diamond board that ranks right above it on the chart—it uses the same type of video chip and amount of memory and costs less than $150. It handled all our multimedia tests well, but it was a smidgen slower than the Diamond Stealth 3D 2000 Pro on PC WorldBench tests, and it didn't run 3D games quite as well.

SMOOTH OPERATOR: Without filtering (on the left), this landing pad looks blocky. Filtering makes images look smoother.

We liked the Hercules board's performance in Monster Truck Madness, but the same driver problem that plagued the STB Nitro 3D in Terracide made that game virtually unplayable with the Terminator 3D/DX, too. In addition, we thought the image quality in Independence Day was lousy. The board's performance in our VRML test was average.

Hercules is one of only two vendors in our Top 10 that offers toll-free technical support, a big plus—especially since the documentation is dense and difficult to follow. *Hercules, 800/532-0600, www.hercules.com.*

READER SERVICE NO. 606

7 STB VELOCITY 3D

PRO: Lifetime warranty, toll-free support, expandable to 8MB.

CON: So-so AVI, a driver bug caused a problem in one 3D game.

VALUE: Good for 2D and animation, but skip it if you're looking for top-notch video or 3D playback.

The STB Velocity 3D is based on the same S3 Virge/VX chip as our second-place Best Buy, the Diamond Stealth 3D 3000. But unlike the Stealth 3D 3000 the $199 Velocity 3D just doesn't live up to its potential. It lagged in our PowerPoint and VRML tests and logged just 11.9 fps in AVI playback. It also had the same problem running 3D games that several other Virge-based boards have had: Due to a driver bug, special effects that use alpha blending, such as explosions, were rendered incorrectly.

But the Velocity 3D does have some strong points. To its credit, it was among the fastest boards at running the animated Macromedia Director test. In addition, STB backs its board with a lifetime warranty and toll-free phone support. Finally, if you want extra graphics board memory in order to handle photorealistic colors at ultrahigh resolutions, the Velocity 3D allows you to add an extra 4MB of RAM.

Take a look at the Velocity 3D if you do image editing and need steady refresh rates at high resolutions and color depths, or if you just want solid 2D performance for your business applications. But if you want to dabble in 3D or video, go with a stronger board. *STB, 888/234-8750, www.stb.com.*

READER SERVICE NO. 607

8 MATROX MYSTIQUE 220

PRO: Fast in 2D and in 3D, good multimedia, expandable to 8MB.

CON: Low quality 3D images, no toll-free or weekend support.

VALUE: Fine for everything but games.

When we describe the $179 Matrox Mystique 220, we're talking about a board we both love and hate. The Mystique is a fast 2D board that's good in multimedia applications and can redraw a 3D scene as quickly as any card we've looked at. On the other hand, if you want good-looking 3D images, look elsewhere: The Mystique's are some of the ugliest we've seen. ▶

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Matrox doesn't include filtering with any of its boards—and it's filtering that keeps 3D graphics from looking blocky and "pixelated." There is an advantage in this for Matrox. Without filtering, frame rates are faster, so game play is smoother. And that's why the Mystique earns only an adequate 3D score: It delivered high frame rate counts in both our VRML and 3D game tests—but who wants fast games when you can't stand to look at them? At least the Mystique was fast in our PowerPoint test at 1024 by 768, and it cranked out 28.3 fps in our AVI video test.

VIEWING VRML: To test images in a virtual world, we moved this desk through 3D space and measured frame rates.

If you must play 3D games with the Mystique, be sure to check Matrox's Web site (www.matrox.com) to see what games work best with the board. In our experience, Direct3D games just don't look good with this graphics board. *Matrox, 800/361-1408, www.matrox.com/mga.*

READER SERVICE NO. 608

9 HERCULES STINGRAY 128/3D

PRO: Best 3D quality, toll-free support.

CON: Expensive, relatively slow 2D, worst AVI video playback.

VALUE: Get it if you're a serious gamer with extra dough to spend.

The $249 Hercules Stingray 128/3D delivers some of the best 3D quality we've seen, but it lags behind the competition in 2D graphics and struggles with video.

The reason the Stingray 128/3D is so great in 3D (both VRML and games) is that it uses a separate 3D chip set from 3Dfx that is widely recognized for producing the best 3D quality on the PC. And the chip set works: Games looked great, and movement in our VRML world was smooth. But the 3Dfx Voodoo Rush chip set is incompatible with the Virge and Tseng graphics chips that lead the way in 2D performance. Instead, the Hercules board uses an Alliance chip that doesn't keep up with the leading edge for 2D. Its PC WorldBench test scores were below those of all the other graphics boards that made the Top 10 chart, and its multimedia performance was worse.

CHIP OFF THE OLD BLOCK: The Hercules Stingray 128/3D and the VideoLogic Apocalypse 5D (not reviewed) have separate 3D chips.

People who use basic business applications such as word processors and spreadsheets probably won't notice the performance hit. But the more graphically intense your programs, the more you'll wish your board had better multimedia performance. Of course, if you dream in 3D, you can't do better than the Hercules Stingray 128/3D. *Hercules, 800/532-0600, www.hercules.com.*

READER SERVICE NO. 609

10 NUMBER NINEFX REALITY 772

PRO: Fast in 2D and multimedia.

CON: Poor in 3D, no toll-free or weekend support, expensive.

VALUE: Graphics professionals would like it, but wait for a price drop.

The fast Number NineFX Reality 772 excels in multimedia, but it's expensive at $279. That's more than the Stingray 128/3D, which has an altogether separate 3D chip set. Expect to see the NineFX Reality 772's price come down rapidly, especially as Number Nine rolls out its new Revolution 3D card (see "Coming Right Up: Tomorrow's 3D"). If you can get the NineFX Reality 772 for less than $200, it's worth a look. The Number Nine board easily handled the 2D applications in our PC WorldBench test suite, performed admirably in PowerPoint and Macromedia Director, and sped along at 30 fps in our AVI playback test. But this is not a board you would want if you're into 3D games.

When the NineFX defaults to a color depth setting for a game, you shouldn't have any problem. But if you choose a color depth of 16 bits, which normally works just fine—colors are distorted. Actually, no board that uses S3's Virge chip can play Direct3D games correctly at 16 bits; the closest they can manage is 15 bits. Although you're cheated out of some colors, you won't really notice. Most companies using the S3 chip offer a 16-bit color setting, even though the games will run at 15 bits. Number Nine's only crime is its relative honesty: It gives you both settings, even though 16 bits doesn't work right.

The NineFX Reality 772 works well in desktop publishing or image editing applications because of its dual-ported memory. But there are better bargains for graphics and publishing professionals. *Number Nine, 800/438-6463, www.nine.com.*

READER SERVICE NO. 610

Beyond the Top 10

online

We evaluated these graphics boards along with those reviewed in this article, but they did not make the Top 10. For more details, see PC World Online (www.pcworld.com/oct97/graphics).

- Creative Labs 3D Blaster PCI
- Creative Labs Graphics Blaster 3D
- Matrox Millennium II
- Number Nine Imagine 128 Series 2e
- VideoLogic Apocalypse 5D
- VideoLogic GrafixStar 750

Brad Grimes is a senior associate editor for PC World. *Testing by Ulrike Diehlmann and Mike Salayko of the PC World Test Center.*

For more information about all products in this article, circle reader service no. 910. ■

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Then, you'll also be registered for the free upgrade. After the ITU-T standard for 56K modems is approved, we'll upgrade your U.S. Robotics x2 technology 56K modem, free of charge. Since every x2 modem is equipped with Flash ROM, we expect the upgrade to be as simple as a software download from the Internet. If it's not, we'll replace your modem with one that does meet the new standard – free of charge. Register your modem, and after the 56K standard is approved by the ITU-T, we will notify you how and when to get your free upgrade. Approval is expected some time in early 1998.

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This offer supersedes all other preceding x2 offers for Sportster and Courier desktop modems. Free month of Internet service offer still applies to Megahertz® 56K PC Card modems.

1 Guaranteed upgrade valid for all currently available Sportster 56K faxmodems (Models 1783, 1784, 1785, 1786, 1787 and 1789), Courier 56K faxmodems (Models 1867, 1868 and 1869) and Megahertz PC Card modems (Models XJ1560, CC1560, XJ5560 and CC5560). This offer valid in the U.S. and Canada only. Upgrades must be claimed by 6/30/98.

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   U.S. Robotics, x2 Delivers More, PO Box 8131, Young America, MN 55551-8131

Any questions regarding this program, please call 1-888-390-6863.
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Phone _____ **E-mail Address** _____

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UPC SAMPLE

SERIAL NUMBER SAMPLE

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7-38168-00615-1	7-38168-00616-8	7-38168-00630-4	7-38168-00629-8
7-38168-00682-3	7-36168-00686-1	7-36168-00669-4	7-36168-00670-0
7-36168-00687-8			

Tape serial number & bar code over this box.

The Web at Your Service

Think the Web is all marketing hoopla? Here's how amateur Websmiths created four public-service sites—plus practical tips for creating your own.

ONCOLINK'S Joel Goldwein, Ivor Benjamin, and Maggie Hampshire.

PHOTOGRAPH: BILL CRAMER

THIS WEB SITE doesn't wallow in flashy graphics, cute animations, or blinking ads. This site is as serious as cancer, because that's what it's about.

BY JUDY HEIM

Started on a shoestring, the University of Pennsylvania's OncoLink site delivers critical facts to cancer patients, their families, and health care professionals. "I've been able to help more people around the world than most physicians can help in a lifetime in their offices," muses cofounder Joel Goldwein.

OncoLink is one of a growing number of public-service Web sites. As these works of care and compassion attest, you don't need pricey software or technical derring-do to build a site that makes the world a better place. All you need is a good idea and the willingness to invest your time.

Here are the stories of four sites that evolved from hobbies into resources trusted by thousands. Besides OncoLink, they include sites prized by animal lovers, gardeners, and expectant parents.

Want to follow their lead? Read on for tips on tools that can help. Then start your own site—a meeting spot, an information kiosk, or just a place to relax along the crowded Web way. ▶

Facts, Compassion, and Courage for Cancer Patients

SITE: OncoLink
ADDRESS: www.oncolink.upenn.edu
CREATORS: Joel Goldwein, Ivor Benjamin, and others
TOOLS: Adobe Photoshop, various text editors

When cancer strikes, you want all the facts, and you want them right away. That's the role OncoLink fills.

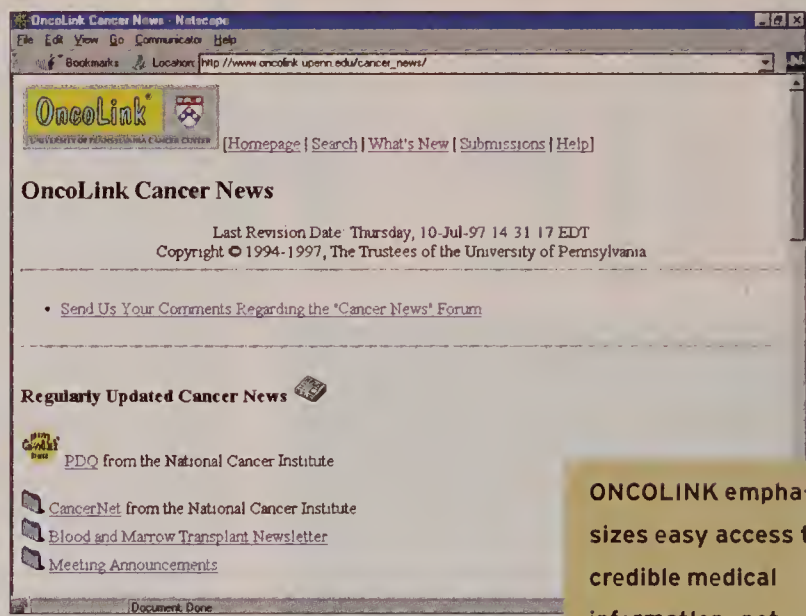
The site began modestly three years ago when Joel Goldwein, associate professor of radiation oncology at the University of Pennsylvania, posted on a Web page a smattering of information for patients, along with some multimedia diagnostic material. "The number of accesses was phenomenal. There were 30,000 to 40,000 accesses in a short time," says Goldwein. "That's more people than you can reach with a medical journal article. I showed the page to my department's chairman. He clearly recognized the utility of this kind of resource and was tremendously supportive."

DOCTORS ON CALL

WITHIN A FEW MONTHS, Goldwein and his colleagues realized that OncoLink would require outside funding and a real staff. Soon after, Goldwein took a six-month sabbatical, during which he threw himself into OncoLink's development with evangelical zeal, working 70 hours a week on the site.

Today OncoLink is funded in part by grants from the National Cancer Institute and a pharmaceutical company. Nurse Maggie Hampshire serves as managing editor, writing features for the site and sifting through the daily deluge of e-mail. She is assisted by one full-time employee and eight part-timers who code pages with text editors, create art for the site, and tend its server. An editorial advisory board of nurses and physicians also pitches in; the members' medical specialties range from gene therapy to head and neck cancer. "We have PCs set up around the office, and some of us work on the site while waiting for patients," explains Goldwein, who devotes about 20 hours a week to answering mail and creating content for the site.

UP Cancer Center personnel carefully screen all OncoLink information for accuracy. Features include links to the Mayo Clinic's site, links to publications like Cancer Weekly Plus, and links to an eclectic mix of articles from news services. Separate sections are devoted to the psychosocial aspects of cancer, cancer causes, and



ONCOLINK emphasizes easy access to credible medical information—not flashy graphics.

Vet Builds Supersite for Animal Enthusiasts

SITE: Electronic Zoo/NetVet
ADDRESS: www.avma.org/ezoo/
CREATOR: Ken Boschert
TOOLS: EditPad, Internet FastFind, LView Pro, Paint Shop Pro, PowerPoint, WebSeeker, WebSite, WordPerfect

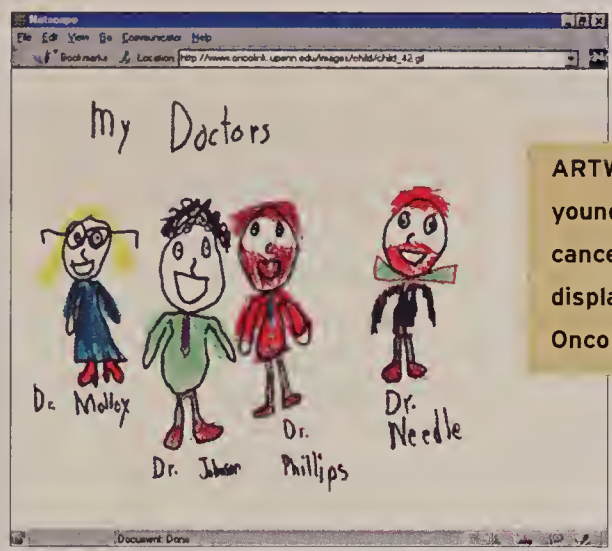
When Scott MacKnight rescued two orphaned baby hummingbirds, he knew where to turn for guidance. The Price, Utah, resident e-mailed Ken Boschert, operator of the Electronic Zoo/NetVet Web site. Boschert, a St. Louis veterinarian, relayed the plea to a vets' mailing list that he runs. Within hours, dozens of vets responded with advice that helped MacKnight care for the fledglings until they were ready to make it on their own. "Without the help I received, the birds would have died within a day or two," MacKnight says.

IT'S HAPPENING AT THE ZOO

ANIMAL LOVERS from around the world flock to Electronic Zoo/NetVet, which

PHOTOGRAPH: JAMES VISSER

ELECTRONIC ZOO/NETVET's Ken Boschert.



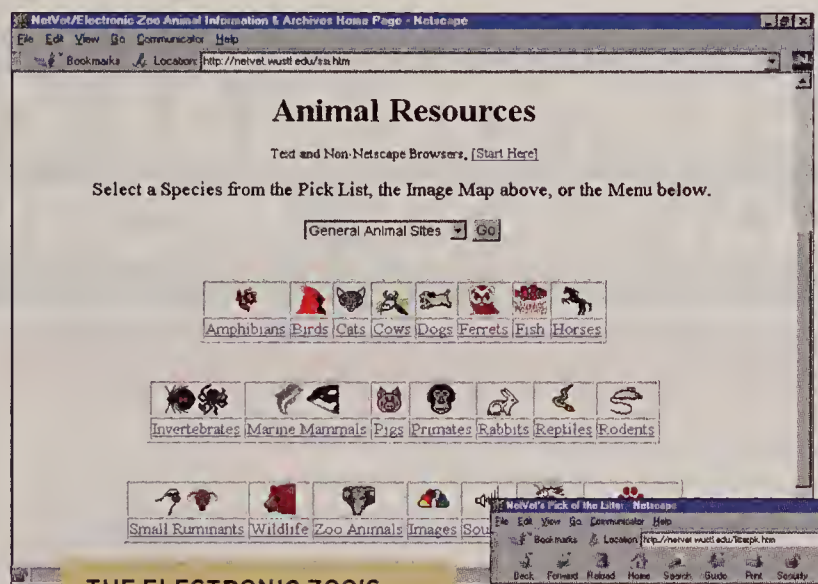
ARTWORK by both young and adult cancer patients is displayed on OncoLink.

related issues such as pain management. The site also includes a column on what it means to have cancer, written by a 14-year-old Philadelphia girl. This feature was inspired by e-mail from children writing school reports on the disease.

"One of the most popular areas of OncoLink is where we answer questions regarding billing," says Ivor Benjamin, a gynecological oncologist and coeditor in chief of the site, along with Goldwein. Benjamin currently spends 15 to 20 hours a week working on the site. "Patients often get shuttled around by their HMOs...We got one letter from the father of a young woman who had an abnormal pap smear. One doctor told her she needed surgery, but she was told by her HMO's physician that surgery wasn't necessary. The father went to the HMO physician with printouts from OncoLink, and the physician was forced to agree that [the woman] needed surgery."

The site avoids flashy graphics. Says Goldwein, "We think carefully about whether a particular graphic will hamper the process of getting to information." One exception is art by cancer patients, including children being treated at the Children's Hospital of Philadelphia.

Although OncoLink's staff has never promoted the site, except for passing out informational brochures at the University of Pennsylvania medical center and posting brief announcements in Usenet newsgroups, it receives over 2 million hits a month. "It's not unreasonable to say that this site has saved lives," says Benjamin. "If one or two patients go to doctors because of information they've read online, or seek treatment earlier, our purpose has been served. "



THE ELECTRONIC ZOO'S links lead visitors to information on everything from aardvarks to zebras.

EACH WEEK, Boschert selects an outstanding animal-related site as Electronic Zoo/NetVet's "Pick of the Litter."

Boschert started Electronic Zoo/NetVet four years ago as a gopher server at Washington University's Medical School. Since then it's sprawled into a Web megasite of over 150 pages, with 15,000-plus links to animal information across the Net. until recently lived on a Windows NT server in Boschert's cluttered office. "I get some of the most off-the-wall e-mail you can imagine," marvels Boschert. "I got one message from a man in Venezuela whose 5-year-old son was bitten by a peccary. He wanted to know if I knew anything about the microbial oral flora of wild pigs, since the boy's infection wasn't responding to antibiotics. Another man in Colombia wanted me to write a health certificate for a lynx, so local authorities wouldn't throw him in jail for rehabilitating one."

Electronic Zoo contains links to general animal information, including pet advice, while the NetVet half of the site is devoted to veterinary resources.

The site has grown so big that running it single-handedly as a hobby has proved hard for Boschert, the associate director of the division of comparative medicine at WU. "I've become an unofficial ambassador for the veterinary profession on the Net," he says.

THE VET'S BULGING MAILBAG

ALTHOUGH BOSCHERT'S e-mail address is inconspicuous on the site, he still receives about 50 e-mail notes each week. "If someone asks me something, I'm going to answer it, although so many of the questions aren't answerable. I always tell writers to review the case with their local veterinarian. I can't assume liability for an animal I've never seen."

Boschert devotes dozens of hours each month to updating links and answering e-mail, working at night and on weekends from his PC at home. He writes HTML code in JG Soft's freeware EditPad text editor. He also uses WordPerfect (he likes its fonts), and Microsoft's PowerPoint presentation software. A graphic artist friend helps out with logos and other images for the site, but Boschert designs most of the graphics himself in Jasc's Paint Shop Pro and MMedia Research's LView Pro.

The toughest chores are keeping the site's many thousands of links updated and finding new links. Boschert's favorite search tool is Forefront Group's WebSeeker, which searches major Web search engines, weeds out any duplicate sites, and prepares reports that ▶

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- Altec Lansing ACS-90 Speakers

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transfer easily to a database. He also uses Symantec's Internet FastFind because it provides more-detailed reports.

Boschert has never promoted the site. Animal lovers find him, arriving through directories or search engines that highlight it. "Initially, it was mostly college people, propeller heads who tapped in," he says. "The second wave was government types. Then I started to see the public coming on, as well as veterinarians. Now I'm seeing more teachers and kids."

Just before we went to press, Boschert completed an agreement to turn the site over to the American Veterinary Medical Association. He will license the site to the AVMA at no cost, in exchange for a guarantee that it will remain free, and will serve as an unpaid consultant in the site's future development.

"The service has enabled me to make many friends and taken me all over the world to speak to groups," he says. "I couldn't be happier that I've provided a service that represents the veterinary profession so well."

A Garden Spot on the Web

SITE: Joe & Mindy's WebGarden
ADDRESS: www.nhn.ou.edu/%7Ehoward/garden.html
CREATORS: Joe and Mindy Howard
TOOLS: HoTMetaL Pro, Matt's Script Archive Web site, Photo-Paint, Windy's Fashionable Page Design Web site

Judging from the wealth of gardening information at Joe & Mindy's WebGarden, horticultural fans may well envision its authors as leathery veterans of dozens of spring plantings, and the site's server as tucked between stacks of pots in a greenhouse.

In reality, Joe and Mindy Howard are twentysomething graduate students at the University of Oklahoma who started growing petunias outside their apartment just a few years ago. Their "cybergarden" runs on a server in the university's physics department.

"We're still learning to be good gardeners," says Joe modestly. The soft-spoken astrophysics student and his wife, an analytical chemist, share a passion for nurturing hard-to-grow blooms. "Hopefully our Web site is helping others learn how to garden as well."

GARDENERS CAN exchange advice and ideas in WebGarden's message forum.

One would never suspect that the Howards consider themselves newbie gardeners. Dazzling pictures of their real-life garden's nasturtiums, morning glories, pansies, and irises spill from their site. Using on-screen captions, their cat Kozmo provides garden-tour commentary. WebGarden also includes a busy message forum for gardeners, along with over 1400 links, neatly organized into categories such as herbs and spices, wildflowers, bonsai, and butterflies.

Four years ago, Mindy asked their apartment manager if she could plant a few flowers near the door of their Norman townhouse. It wasn't long before the Howards had filled the barren landscape around their apartment complex with geraniums, celosia plumosa, and yes, more petunias. Two years ago, they started WebGarden as a single page with five links.

The Howards create the site's pages with SoftQuad's HoTMetaL Pro HTML-authoring package on a Windows 95 PC at home. Most of the pictures are photographs of the Howards' gardens that they've snapped with an old camera. They scan these photos with a Hewlett-Packard ScanJet 4C and spruce them up in Corel's Photo-Paint image editing software. Garden-related graphics come from Windy's Fashionable Page Design (www.windyweb.com/design). ▶

WEBGARDEN'S Mindy and Joe Howard.

PHOTOGRAPH: STEVE JENNINGS/GAMMA-LIAISON; ILLUSTRATION: PETER HOEY

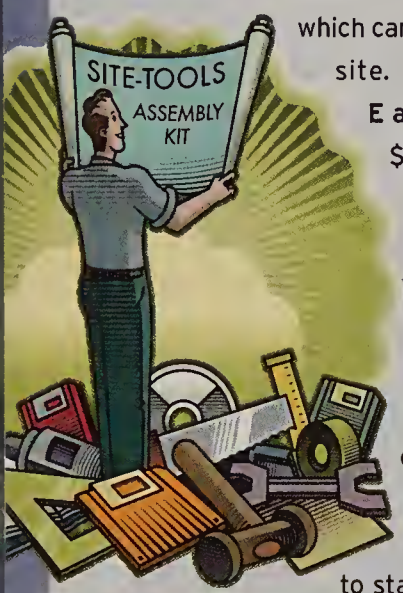
A Start-Up Tool Kit for Public-Spirited Websmiths

INTERESTED IN FOLLOWING in the footsteps of the Web site creators profiled here? If you've got a good idea and can put some time into the project, you don't need much money or technical expertise.

Rule number one is to choose a topic that's close to your heart. You're likely to spend a great deal of time working on the site, so find a subject that will make the process enjoyable.

Where to Put Your Site: Web Hosting Services for Little (or No) Cost

EVERY WEB SITE NEEDS a home. Fortunately, low-cost possibilities are numerous. Most personal Internet access accounts include a few megabytes of server space, which can house a simple site. For example, **EarthLink's** $19.95-a-month TotalAccess plan provides 2MB of space, along with unlimited dial-up access to the Internet. You also get Web space with **America Online** and **CompuServe** accounts. There are even some advertising-supported services that will host your site for free, most notably **GeoCities** (www.geocities.com).



Internet service providers also offer dedicated Web site hosting services. Aimed primarily at corporate customers, these offer such bonuses as custom domain names (like www.yournamehere.com), the ability to use server-based scripting for more sophisticated features such as discussions, and the capacity to handle large numbers of visitors. Per-month charges range from under $20 to hundreds of dollars, depending on the amount of space your site consumes, the amount of traffic it attracts, and the level of service the ISP provides.

Tools to Create Your Site: Web Authoring Without Anguish

IF YOU'VE never created a Web page before, the easiest way to start your journey is with the HTML tools found in your Web browser or word processor. The new Web browser suites, **Netscape Communicator** and **Microsoft Internet Explorer 4.0,** both come with simple HTML editors built in. They offer templates and wizards that build simple pages for you. However, features in these editors are quite limited—neither lets you create forms, for instance.

The current versions of all the major word processors—**Corel WordPerfect, Lotus Word Pro,** and **Microsoft Word**—also let you export a document in HTML format. This is a straightforward way to build simple pages, but these exports are not without their snafus. A document's formatting does not always translate properly to HTML code, nor do word processors let you easily break up text into multiple Web pages.

As your Web-site ambitions grow, you'll probably want to develop at least a basic knowledge of HTML formatting tags, and you may want to create your pages in a software package designed specifically for Web authoring. To see what HTML tags look like and how they work, examine the code of any page on the Web by pulling down your browser's *View* menu and selecting *Page Source*. To compose a page directly in HTML, type your text and the HTML tags to format it into your word processor, and save the document as a text file with an .htm suffix. Preview it in your browser by selecting *File* and choosing *Open Page* or *Open File*.

TOP TOOLS FOR WEB AUTHORING AND MORE

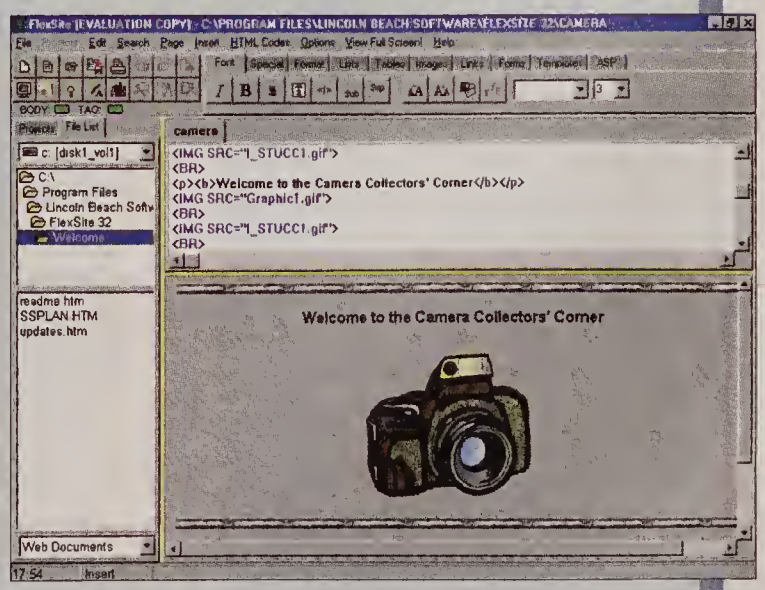
SHAREWARE HTML authoring packages abound; one that's hard to outgrow is Lincoln Beach's **FlexSite 2.5.** As you work, FlexSite displays your Web page in a window below its HTML code. FlexSite's standard version costs $50; the professional version, which supports forms, frames, and image maps, is $90.

If you want more power, consider Microsoft's $149 **FrontPage 97**—it's outstanding among commercial packages. You can build tables, forms, and even rudimentary discussion groups without arcane programming. Site-management tools include the ability to view pages in tree diagrams.

Of course, a good HTML editor is only one of the tools you'll need to build a site. Jasc Software's shareware **Paint Shop Pro 4.12** offers all the graphics tools most Web authors need, for a thrifty $69. You can use it to crop, brighten, and resize images, as well as to convert images from one format to another.

Tetranet Software's **Linkbot 3.0** will check your site's links, plus map the site and inform you of orphan files. You can download a free 30-day trial version from Tetranet. The standard version retails for $99.95.

—Judy Heim and Harry McCracken



FLEXSITE shows both HTML code and a preview as you create a Web page.

Four Steps to a Great Public-Service Site

If you decide to create your own public-service site, take these cues from the successful sites profiled here.

Create exclusive content.

1 LINKS TO OTHER sites are great, but it's the unique items that set a site apart, such as StorkNet's original articles and WebGarden's virtual garden tours.

Update your site frequently.

2 WHEN VISITORS STOP by often to see what's new, you've got the beginnings of a virtual community. Just make it easy for them to find the newest items.

Get visitors involved.

3 YOUR SITE will mean more if visitors can participate in interactive features, such as WebGarden's message forum and OncoLink's questionnaires.

Cross-pollinate with related sites.

4 A GREAT WAY to publicize a site is to work with other creators. StorkNet, for example, is part of two collectives that plug their sites with links and ads.

The site's search and add-a-link features and its message forum rely on server-based scripts downloaded from Matt's Script Archive (www.worldwidemart.com/scripts). The Howards recommend this as the first stop for any budding Web page programmer who wants to make a site interactive.

They spend about 10 hours a week working on the site; except for submitting its URL to Submit-It, they haven't promoted their site. Future plans for the site include automating link updating with a program such as Linkbot, and adding more pictures and features written by other gardeners.

Although Joe and Mindy Howard have never met any of the gardeners who frequent their site, they've made many friends. Even Kozmo gets e-mail from other garden-loving cats. "We get a lot of messages in our guest book that say, 'I've finally found a Web site that has everything at my fingertips,'" says Mindy.

Site Design Help

IF YOU'RE A NEWCOMER to creating and running a Web site, you need lots of advice. Appropriately enough, some of the most helpful resources you'll find are on the Web.

Web Design Group An HTML guide, design tips, and a message forum. www.htmlhelp.com

World Wide Web FAQ Answers to basic questions about creating a Web site. www.boutell.com/faq/

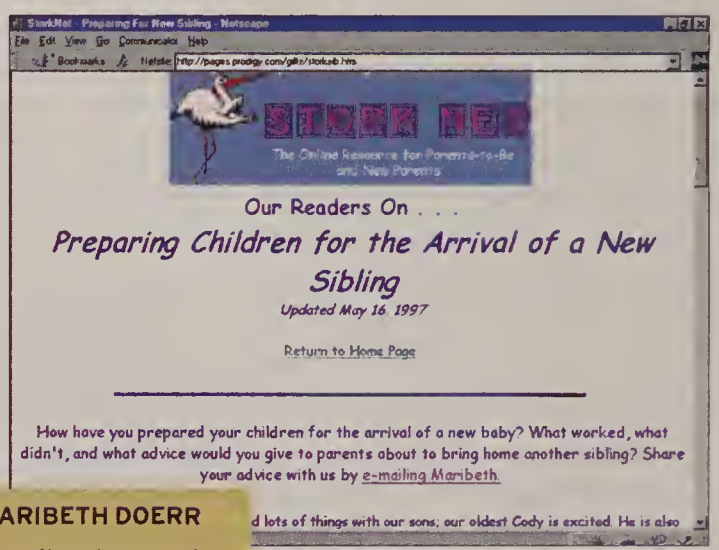
Background FAQ Everything you ever wanted to know about creating backgrounds for your pages. www.sci.kun.nl/thalia/guide/color/faq.html

Royal Frazier's GIF Animation on the WWW Learn the fine points of GIF animations. members.aol.com/royalef/gifanim.htm

The 1st Internet Gallery of GIF Animation Ready-made animations that you can add right to your site. members.aol.com/royalf1/galframe.htm

Parents-to-Be Share Advice and Joy

SITE: StorkNet: The Online Resource for Parents-to-Be and New Parents
ADDRESS: pages.prodigy.com/storknet
CREATOR: Maribeth Doerr
TOOLS: Hippie, Paint Shop Pro, Prodigy file libraries



Maribeth Doerr's favorite e-mail comes from expectant dads. "They want to understand their wife's pregnancy, but at the same time they feel so left out," says the creator of StorkNet. Doerr theorizes that many dads-in-waiting feel comfortable tapping into her pregnancy support Web site because they can seek information in private, while their wives probably think they're at the computer calling up sports scores. "There have been instances in which both moms and dads have written me for advice, neither realizing that the other was also writing me," she laughs.

MARIBETH DOERR compiles the experiences of StorkNet visitors into articles on many pregnancy-related topics.

StorkNet, which has been online for about a year and a half, is an outgrowth of Doerr's work as a Reno, Nevada, journalist, political activist, and author of books on pregnancy. But the site draws its inspiration just as directly from her private life. Doerr, who has two young sons, also knows firsthand what it's like to lose a baby to birth complications. Through StorkNet, she now helps other expectant parents enjoy successful pregnancies.

Doerr, a self-taught Web author, found putting up StorkNet's pages and links easy. But she wasn't prepared for her own feelings about running the site. ▶

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STORKNET'S Maribeth Doerr with sons Eric (foreground) and Chad.

"As a bereaved parent who can no longer have children, some of the pregnancy aspects were painful for me to deal with initially," she remembers. "I needed to back away." But as she started to hear from parents who appreciated her site, her enthusiasm returned.

Several hundred expectant and new moms and dads visit the site each day. Many initially tap in because of anxiety about their pregnancy, such as a woman who was searching for information about miscarriages because she was bleeding. She found solace in the stories of women who'd had similar experiences. When her pregnancy continued normally, she continued to visit for tips on handling morning sickness.

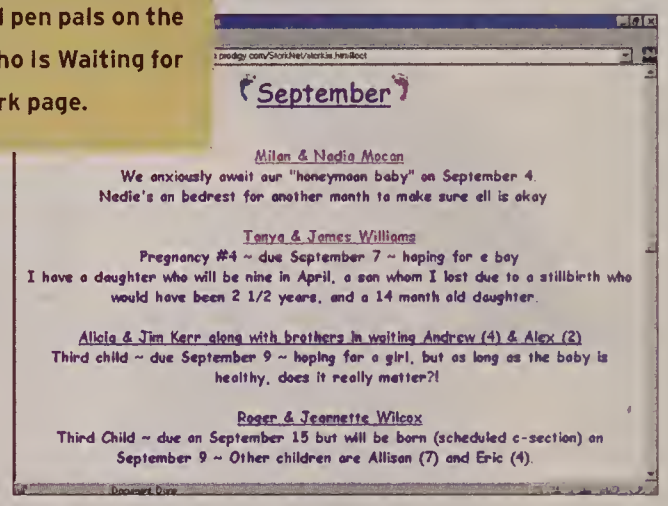
ADVICE, PEN PALS, AND MORE

STORKNET'S 30-PLUS pages include links to topics ranging from breast-feeding to day care, from multiple births to getting baby to sleep. One page lists StorkNet frequenters who are expecting, and includes e-mail links in case an expectant parent is looking for a pen pal. Another offers happy details of new babies. Expecting parents can also buy books through a cooperative arrangement with Amazon.com, although this hasn't garnered many sales so far. "I hate to be too commercial in nature, but it would be nice to get some remuneration for running the site," Doerr acknowledges.

Working on the site consumes about 10 hours of Doerr's time each week. She creates pages with Hippie, a WYSIWYG authoring program. She'd love to add more interactivity, but "when nauseated pregnant women get on a computer, the flicker can exacerbate nausea, so I hate to make the site's pages too busy."

Doerr has done little to promote StorkNet, but she's found that its reputation spreads almost magically by word of mouth. "I was at a party a few months ago, and when a pregnant woman asked what I did on my computer, I explained StorkNet. Her mouth dropped. 'You're StorkNet?' she gasped. 'I love that page!'"

EXPECTANT PARENTS can spread the news and find pen pals on the Look Who Is Waiting for the Stork page.



Contributing editor Judy Heim is co-author of The Quilter's Computer Companion *(No Starch Press, 1997, 800/420-7240). Harry McCracken is a senior associate editor for* PC World. ■

Where to Buy

EditPad 3.11
free, JG Soft, www.tornado.be/~johnfg

FlexSite 2.5
standard version registration $50, professional version registration $90; Lincoln Beach Software, www.lincolnbeach.com
READER SERVICE NO. 727

FrontPage 97
$149 list, Microsoft, www.microsoft.com/frontpage
READER SERVICE NO. 728

Hippie 4.10
$29.95 list, Trout Software, pages.prodigy.com/hippie
READER SERVICE NO. 729

HoTMetaL Pro
$159 list, SoftQuad, www.softquad.com
READER SERVICE NO. 730

Internet FastFind
$49.95 list, Symantec, www.symantec.com/iff/fs_iff.html
READER SERVICE NO. 731

Linkbot 3.0
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READER SERVICE NO. 732

LView Pro 2.0
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Paint Shop Pro 4.12
$69 list, Jasc Software, www.jasc.com
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Photo-Paint 7 Plus
$495 list, Corel, www.corel.com
READER SERVICE NO. 735

WebSeeker 3.2
$49.95 list, ForeFront, www.ffg.com/internet.html
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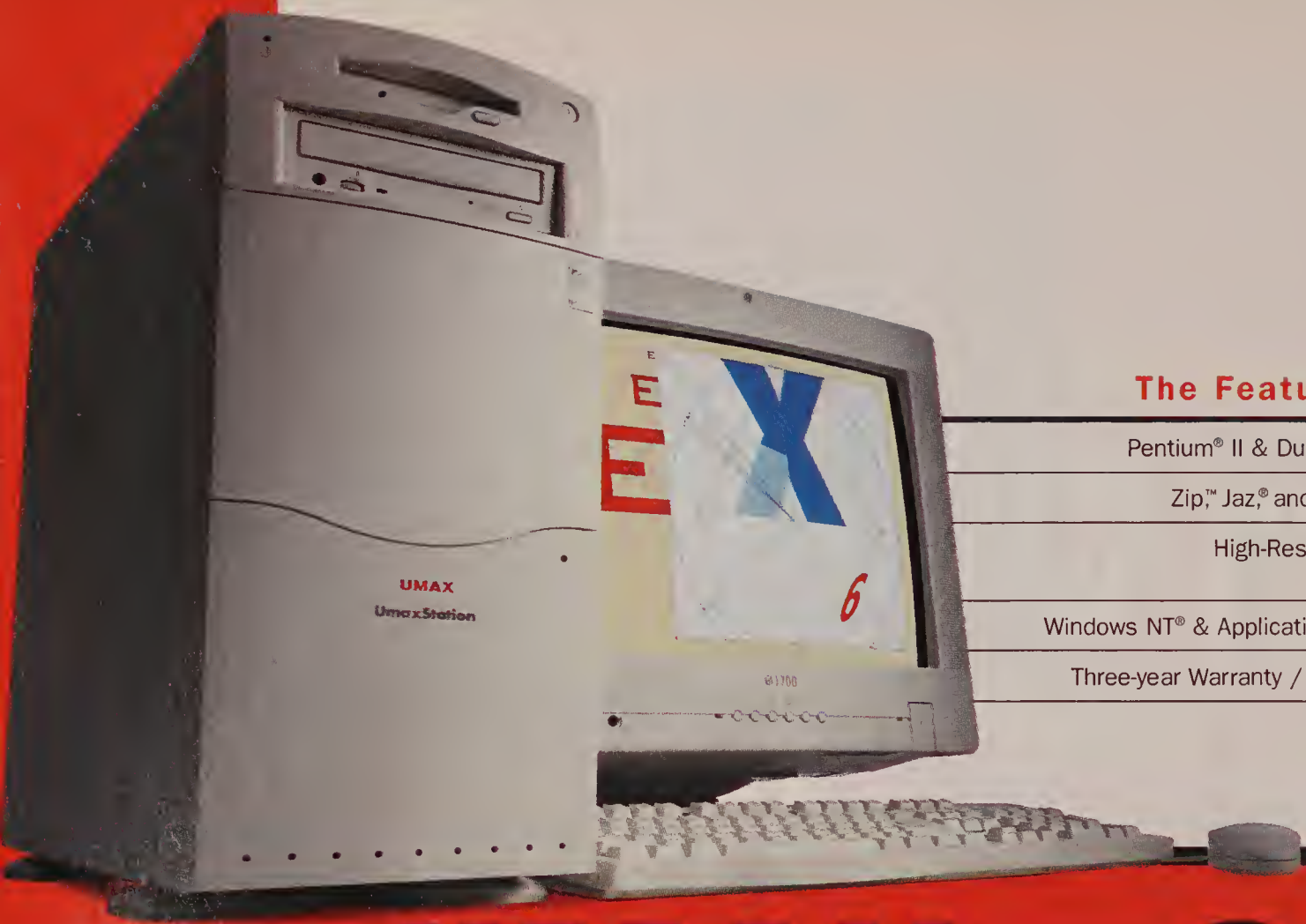

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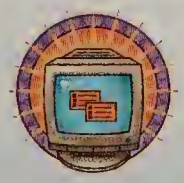
283 Printers

287 Monitors



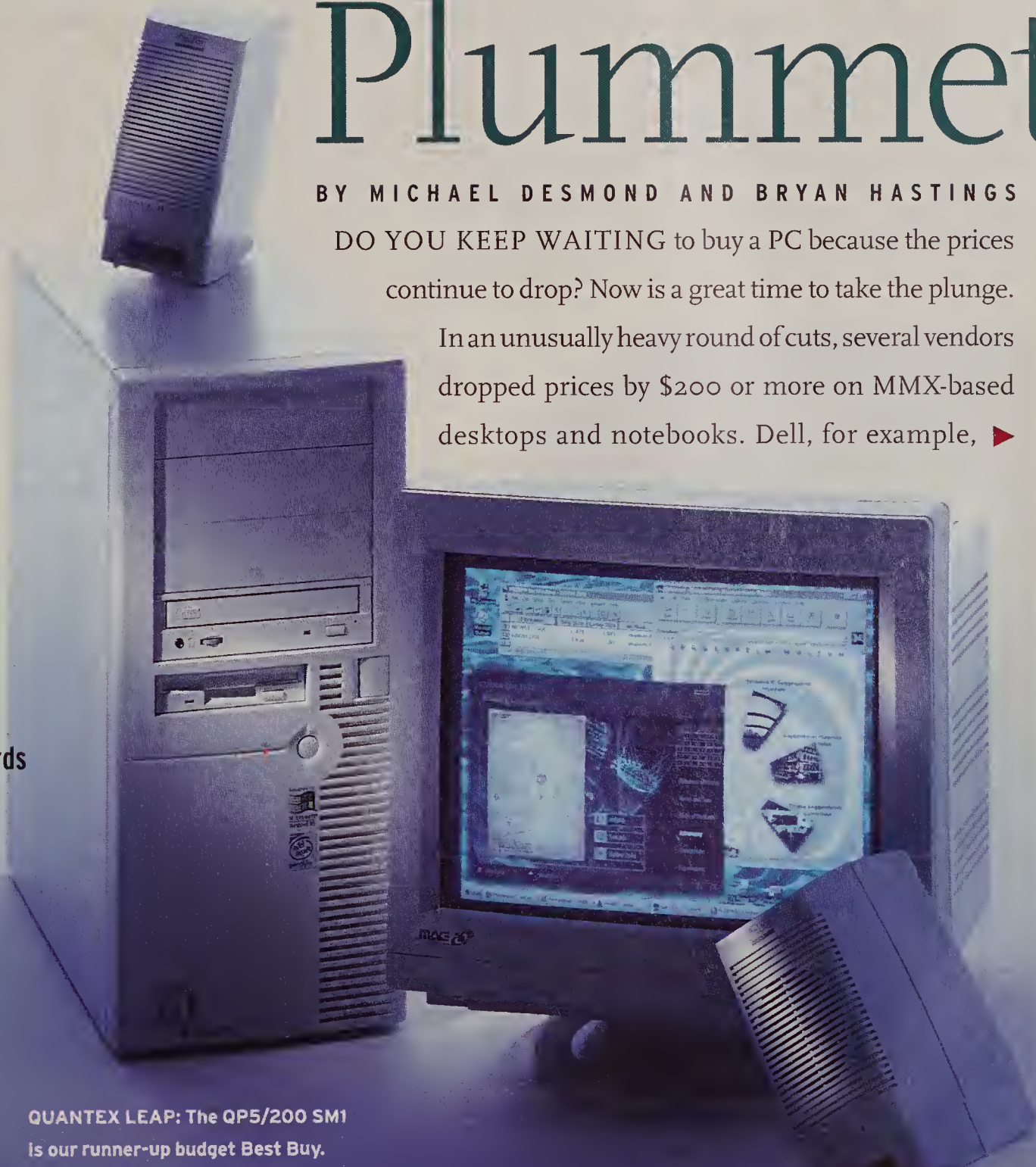
289 Graphics Boards

291 Modems

MMX PRICES Plummet

BY MICHAEL DESMOND AND BRYAN HASTINGS

DO YOU KEEP WAITING to buy a PC because the prices continue to drop? Now is a great time to take the plunge. In an unusually heavy round of cuts, several vendors dropped prices by $200 or more on MMX-based desktops and notebooks. Dell, for example, ▶



QUANTEX LEAP: The QP5/200 SM1 is our runner-up budget Best Buy.

PHOTOGRAPH: STAN MUSILEK ICONS: JEFFERY PELO

chopped $380 off the price of the Dimension XPS M200s, the top budget Best Buy that now costs $2199. On our Notebooks charts, Gateway 2000 took $300 to $450 off most of its Solo line, including several chart-makers. And we saw $200-to-$300 drops in a number of other places as well. Systems are also debuting at very low prices: Quantex's new QP5/200 SM1 MMX, our second-place budget Best Buy, is one of the fastest of the well-supported PCs you can buy for under $2000.

CYRIX'S 6X86MX: LATEST PII CHALLENGER

WHY ARE WE SEEING price breaks that Crazy Eddie could crow about? Intel made unusually deep price cuts in August—slashing MMX processor prices up to 50 percent—and it plans another big round of reductions in November. According to product managers at Dell and Gateway 2000, these cuts played a key role in their systems' price drops.

Take a look at our Budget Desktops chart, and you'll see why Intel has been cutting CPU prices. Over one-third of the PCs on the chart sport non-Intel chips—unthinkable just six months ago—and some of those systems are posting huge PC WorldBench scores that challenge those of Intel's vaunted Pentium II.

Advanced Micro Devices debuted its K6, a processor that offers nearly the speed and multimedia support of the Pentium II for hundreds of dollars less. Now Cyrix weighs in with the 6x86MX (formerly known as the M2). This month we tested two desktop systems based on the 200-MHz version of the 6x86MX and found terrific performance for the price. USA Flex's $1999 Flex Performer system—our number eight budget desktop—scored 235 on the PC WorldBench. CyberMax's $1834 ValueMax C5 200+ MMX tower scored 241; while it missed the chart because of its relatively limited features, it's the second-fastest system you can buy for under $2000. (Only Micro Express's K6-based MicroFlex-PR/233, priced at $1849, is faster.) In terms of performance, the closest Intel-based competitors are Pentium MMX-233 systems. These PCs have an average PC WorldBench score of 237, falling slightly below the average for systems based on 6x86MX-200 and K6-PR233 processors, but costing more than $600 more.

CAN'T JUDGE A NOTEBOOK BY ITS CPU: Fujitsu's LifeBook 435Dx has a PMMX-133 but runs like most PMMX-150s.

Intel's marketing machine tries to convince the consumer that "Intel Inside" is the only way to go, but many people will be quite satisfied with the alternatives. The high-end AMD and Cyrix systems lag behind the Pentium II PCs for multimedia-intensive applications such as Adobe Photoshop and Ray Dream Studio (see "New Digital, USA Flex Systems: Intel Is Not Inside," *New Products*, September), but they shine in running general-purpose business apps. Even big-name vendors are starting to look outside Intel: This month we reviewed Digital's $1670 Venturis FX-2 6166K, based on AMD's 166-MHz K6 chip. Digital's system reliability rating of just fair and its skimpy support policies kept the Venturis off the budget chart.

COMING TO A PC NEAR YOU? Gateway's G6-266XL is the first chart-maker to play DVD movies—but they're jittery.

DVD ON THE PC: DISAPPOINTING VIDEO DISPLAY

A COUPLE OF COMPUTER makers seem to have jumped the gun on DVD, the latest hot consumer-electronics technology, which allows manufacturers to squeeze full-length, high-resolution films onto 5.25-inch discs that look like CDs. We looked at Gateway 2000's pricey G6-266XL and Seanix's CS DVD 200 minitower; each includes a built-in DVD-ROM drive that doubles as a CD-ROM drive.

Although the two systems let you watch movies on a PC, don't put on the popcorn just yet. The DVD movies we played had great full-screen resolution, but on the Gateway images were plagued with jittery frames and jagged, pixelated patches. The Seanix froze up while playing one disc, and refused to play the sound track on another. We recommend holding off on PC-based DVD until vendors get it right.

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following section should answer most of them. If not, ask us; see page 14 for contact information.

How do the charts work? The Top 20 and Top 10 charts are evolving lists of the best PCs, monitors, modems, printers, and graphics boards we've tested. The Top 20 charts are divided by price. Power desktops cost $2500 or more; power notebooks cost $2750 or more. Every month we test the latest products in each category and compare them to the pool of items we've already reviewed. As new products earn places on the charts, those at the bottom drop off. Price cuts also cause chart changes.

Where do you get your prices? We estimate street prices based on vendor information and our own research, including surveys of retail outlets. We recheck all prices every month.

What does the overall rating mean? It's the sum of all our tests—both hands-on evaluations and automated speed tests. The scale is 1 to 100, so a product that scores in the 90s is generally considered exceptional, one in the 80s is among the best, one in the 70s is above average, and one that scores lower usually doesn't place.

What does the PC WorldBench score mean? It's a measure of how fast a PC is in relation to our baseline machine, a Dell P75t configured with 8MB of RAM, a 540MB hard drive, and no secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline unit.

Where do the scores for reliability, support quality, and support policies come from? The reliability and support quality scores come from readers who respond to the Reliability and Service fax-back survey in each issue of *PC World*. The policies score is based on the vendor's support policies (such as length of warranty and support hours).

What do all those word scores mean? Word scores for performance and price are based on a product's rating in relation to other products in its category. For example, a budget PC that is rated "expensive" is high priced only in relation to other budget PCs. Likewise, a power notebook rated "good" for performance is good only in relation to other power notebooks. Word scores for other categories, such as features, are relative to all desktops or all notebooks.

Where can I find the online version of the Top 100? Go to PC World Online (www.pcworld.com). There you'll find not only the current issue of *PC World* and reviews for the last 10 months, but some extra features you'll want to check out. For one thing, PC World Online includes reviews you won't find in print. If a product misses a chart and we don't cover it here, you can go directly to an online review by using the URL provided in each Top 100 section.

Have you ever wished you could build your own chart based on your buying criteria? You can, with Buyer's Guide, our Web site's unique chart customizer. Buyer's Guide combines your criteria with *PC World*'s current data and test results to generate customized Top 20s and Top 10s. For instance, if you want your chart to rank notebooks that have 120-MHz processors and 1.6GB hard drives, the guide's Personal Adviser will find and rank all the machines that fit your specifications.

TURNING BACK THE CLOCK SPEED

WHILE INTEL was making a lot of noise about faster CPUs, it quietly released a new Pentium MMX-133 notebook processor—and in so doing, pushed the entry-level processor for MMX-based portables down from 150 MHz. The PMMX-133 should result in a new crop of fast but inexpensive notebooks. The first of these we've seen is Fujitsu's $1999 LifeBook 435Dx. With a PC WorldBench score of 191, it kept pace with the typical PMMX-150 notebook we've reviewed.

IMPROVE YOUR IMAGES

GRAPHICS BOARD VENDORS keep telling us how terrific their products are at handling 3D. Indeed, some are—but in "2D and 3D Graphics Boards: You Can't Always Get What You Want" we evaluate the latest crop of accelerators and find that no one board does it all. ATI's $219 3D Pro Turbo PC2TV earned our top Best Buy: It's affordable, offers one of the best combinations of 2D and 3D performance, and is the best choice for animation-based multimedia presentations. But if video's your thing, go for the $170 Diamond Stealth 3D 3000, which placed second overall. For 3D buffs, Hercules's $249 Stingray 128/3D at number nine is our pick.

PENNY WISE, PRINT FOOLISH: Canon's BJC-250 is only $179, but you have to swap black and color ink cartridges.

If you're searching for a low-cost color ink jet, check out this month's Top 10 Printers. We tested Canon's latest crop, including the new color Best Buy, Canon's BJC-4300. This $199 unit is one of the least expensive color ink jets we've seen from a major vendor, and it prints nicely on plain paper as well as on ink jet stock. The BJC-250, which we also tested, is even cheaper at $179, but not as convenient.

Michael Desmond and Bryan Hastings are senior associate editors for PC World. *Assistant Editor Grace Aquino, Editorial Researcher Julie Campagna, Editorial Assistant Mick Lockey, Associate Editors Melissa Riofrio and JoAnne Robb, and freelance writers Jon Jacobi and Dan Littman contributed to the Top 100. Testing for the Top 100 by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeffrey Kuta, Mike Salayko, and Susan Silivius. See page 14 for contact information.*

PC WORLD

TOP 20 POWER DESKTOPS

	SYSTEMS	Last month	Month tested	Street price (7/16/97)	CPU	Comments
1	Dell Dimension XPS H266 800/388-8542 www.dell.com	1	July 97	$3149	Pentium II-266	Ultrafast, with superb multimedia, 2ip drive, 56-kbps modem.
2	Dell Dimension XPS M233s 800/388-8542 www.dell.com	2	Sep 97	$2599	Pentium MMX-233	Top service and reliability, best PMMX-233 performance, big hard drive.
3	Gateway 2000 G6-233 800/846-2000 www.gateway.com	3	Aug 97	$2839	Pentium II-233	$50 drop on fast, loaded PC with Ultra-DMA hard drive.
4	Dell OptiPlex GXi 5200M 800/388-8542 www.dell.com	4	June 97	$3112	Pentium MMX-200	Do-it-all corporate PC has ethernet, multimedia, voice modem; now $52 less.
5	Gateway 2000 G5-233 800/846-2000 www.gateway.com	6	Sep 97	$2508	Pentium MMX-233	$170 more affordable, full multimedia, 56K modem, reliability rating just fair.
6	Quantex QP6/233 SM-3 800/896-4898 www.quantex.com	7	Sep 97	$2499	Pentium II-233	Low-cost, expandable, lots of software, improved support record.
7	Dell OptiPlex GXpro 200 800/388-8542 www.dell.com	10	July 97	$3749	Pentium Pro-200	Corporate powerhouse is slightly faster than its PMMX-200 sibling.
8	NMC Expert Pro II 800/800-4662 www.natmicro.com	15	Sep 97	$2595	Pentium II-266	Very fast PII-266 moves up chart with $294 price cut; support is minimal.
9	Sys Technology Performance Pro 266A 800/613-9963 www.systechnology.com	–	NEW	$3249	Pentium II-266	Superquick PC has big hard drive, great multimedia; weak support policies.
10	Quantex QP6/200 SM-4 800/896-4898 www.quantex.com	13	May 97	$2649	Pentium Pro-200	Nimble business PC costs $150 more than PII-233; improved support.
11	Premio FX2 Shadowhawk 266 800/677-6477 www.premiopc.com	–	NEW	$2779	Pentium II-266	Very fast PII-266 has 64MB of RAM; lacks a modem.
12	DTK Quin-55M/PM233 800/289-2385 www.dtkcomputer.com	–	Sep 97	$2510	Pentium MMX-233	$140 price cut puts this fast tower on the chart; comes with 56K modem.
13	Gateway 2000 G6-266XL 800/846-2000 www.gateway.com	–	NEW	$5128	Pentium II-266	Superfast, with DVD drive, 21-inch display, 9GB hard disk, tape backup; pricey.
14	Digitron PS4000 888/708-2800 www.digitronpc.com	–	NEW	$3999	Pentium II-266	Blazing minitower has great multimedia; expensive.
15	Nova K6-200TX 800/461-5535 www.novacompinc.com	–	Sep 97	$2499	AMD K6-PR200	Big $300 price chop puts lively minitower on chart; support is sparse.
16	Acma EXP 200 800/786-6888 www.acma.com	18	Aug 97	$2495	Pentium MMX-200	Fast, affordable PMMX-200 comes with CorelDraw; limited support.
17	CLR Infinity PT5-A 200MMX 800/611-1555 www.clrusa.com	19	July 97	$2720	Pentium MMX-200	Reasonably fast minitower has good multimedia and support policies.
18	HP Vectra VA 6/200 MT 800/322-4772 www.hp.com	11	Mar 97	$3134	Pentium Pro-200	Good corporate PC; reliability ratings slipped from best to good.
19	Total Peripherals Archer 2000A 800/923-7718 www.totalpc.com	–	Aug 97	$2499	Pentium MMX-200	$430 price slash puts this fast, well-appointed minitower on chart.
20	IBM PC 365 800/426-2968 www.pc.ibm.com	20	Mar 97	$4013	Pentium Pro-200	$208 price drop helps keep business PC on chart, despite support score slip.

Best Buy See features chart, page 246; performance chart, page 248. Recommended as home system

[1] Insufficient data.

INTEL STILL DOMINATES THE POWER DESKTOPS CHART, but competition is brewing. The AMD K6–based Nova K6-200TX landed at 15th place this month, after a $300 price cut lifted this quick minitower into contention. In addition to four new Pentium II-266 systems on the chart this month, two others—the Unicent Avanta 266 XLS and Digital Celebris GL-2 6266—placed not too far behind the pack. The Avanta scored a 264 in the PC WorldBench test suite, joining the Sys Technology Performance Pro 266A (in ninth place) as the fastest PC we've ever tested. Skimpy documentation and poor design, however, kept us from giving the Avanta a Top 20 nod.

SCORECARD

★ Overall rating	PC WorldBench score/performance	Vendor's system reliability	Features and design	Price	Vendor's support quality/policies	Reader service number
97	263/outstanding	best	outstanding	average	best/best	668
96	243/outstanding	best	outstanding	very inexpensive	best/best	669
92	251/outstanding	fair	outstanding	inexpensive	best/best	670
90	226/very good	best	outstanding	average	best/best	671
88	240/outstanding	fair	very good	very inexpensive	best/best	672
88	247/outstanding	fair	good	very inexpensive	best/best	673
85	230/very good	best	good	expensive	best/best	674
84	260/outstanding	[1]	very good	very inexpensive	[1]/fair	675
83	264/outstanding	[1]	very good	average	[1]/poor	676
83	230/very good	fair	good	inexpensive	best/best	677
82	257/outstanding	[1]	good	inexpensive	[1]/poor	678
82	238/outstanding	fair	very good	very inexpensive	[1]/poor	679
81	263/outstanding	fair	very good	very expensive	best/best	680
81	259/outstanding	[1]	outstanding	expensive	[1]/poor	681
80	238/outstanding	[1]	good	very inexpensive	[1]/poor	682
80	233/very good	[1]	very good	very inexpensive	[1]/fair	683
80	229/very good	[1]	very good	inexpensive	[1]/good	684
79	229/very good	good	good	average	fair/fair	685
79	237/outstanding	[1]	good	very inexpensive	[1]/worst	686
79	232/very good	fair	outstanding	very expensive	fair/good	–
Scorecard weightings ▶	Performance 25 percent	Reliability 25 percent	Features 20 percent	Price 15 percent	Support 15 percent	All products: 906

This Month's Best Buys

1 DELL DIMENSION XPS H266

PRO: Lightning fast, fine features, now upgraded with a 24X CD-ROM drive

CON: Case is hard to remove

Dell's top-rated Dimension XPS H266 just continues to get better. At $3149, this Pentium II-266 powerhouse sells for little more than competing models from Gateway 2000 and NMC, and its CD-ROM drive has been upgraded from 12X to 24X. In addition to Dell's unrivaled record of service and support, the XPS H266 offers terrific performance, with a PC WorldBench score of 263 that is among the best for Pentium II-266 systems.

The Dimension is packed with features. The Matrox Millennium II graphics card boasts a substantial 8MB of video memory, and the 17-inch monitor produces exceptionally crisp text and graphics. The Dimension also includes a 56-kilobits-per-second modem that uses 3Com's U.S. Robotics x2 technology. The system's speedy 24X CD-ROM drive, wavetable-equipped Yamaha sound card, and Altec Lansing ACS 90 speakers with subwoofer comprise a great multimedia setup.

Dell Dimension XPS H266

In addition, you get a huge 6.4GB hard drive and a software bundle that includes Microsoft Office 97 Small Business Edition. The company also throws in an Iomega Zip drive, which accepts 100MB floppy-style disks.

We did have a couple of complaints. Dell, like most vendors today, supplies separate manuals for the main system and each peripheral. Also, pulling the case's side panel off and putting it back on takes some finagling.

Dell's service and system reliability continue to score high in our ongoing fax-back survey.

2 DELL DIMENSION XPS M233S

PRO: Fastest PMMX-233, large hard disk, Zip drive, upgraded CD-ROM drive and modem

CON: RAM maxes out at 64MB

An improving balance of power and value helps the Dell Dimension XPS M233s hold steady at second place on our Power Desktops chart. The $2599 minitower sells for $300 less than it did last month and now comes with a faster CD-ROM drive and modem. The improvements are welcome to this blazing Pentium MMX-233 system, which posted a PC WorldBench score of 243—the fastest of any Pentium MMX-233 system we've tested so far.

Dell Dimension XPS M233s

This month, Dell boosted the variable-speed 12X/16X CD-ROM drive to one that supports a top 24X spin rate. Also, the ▶

TOP 20 POWER DESKTOPS — STANDARD FEATURES

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	Screen pitch (mm)	CD-ROM drive speed
1	Dell Dimension XPS H266*	Pentium II-266	32	512	6.4	Matrox Millennium II	B/WRAM	17/15.9	.25	24X
2	Dell Dimension XPS M233s*	Pentium MMX-233	32	512	6.4	Matrox Millennium II	B/WRAM	17/15.7	.28	24X
3	Gateway 2000 G6-233*	Pentium II-233	64	512	3.2	STB Virge 4MB 3D PCI	4/VRAM	17/15.9	.28	16X
4	Dell OptiPlex GXi 5200M*	Pentium MMX-200	32	512	3.2	Matrox Millennium II	4/WRAM	17/16	.28	8X
5	Gateway 2000 G5-233*	Pentium MMX-233	32	512	3.2	STB Virge 4MB 3D PCI	4/VRAM	17/16	.28	16X
6	Quantex QP6/233 SM-3	Pentium II-233	32	512	4	Matrox Millennium II	4/WRAM	17/16	.25	16X
7	Dell OptiPlex GXpro 200	Pentium Pro-200	32	512	3.1	Matrox Millennium	4/WRAM	17/15.8	.28	8X
8	NMC Expert Pro II	Pentium II-266	64	512	5.1	Matrox Millennium II	4/WRAM	17/15.9	.28	16X
9	Sys Technology Performance Pro 266A	Pentium II-266	32	512	6.4	Number Nine Revolution 3D	B/WRAM	17/15.8	.26	16X
10	Quantex QP6/200 SM-4	Pentium Pro-200	32	256	3.2	Matrox Millennium	4/WRAM	17/16	.28	12X
11	Premio FX2 Shadowhawk 266	Pentium II-266	64	512	3.2	ATI 3D Pro Turbo PC2TV	4/SGRAM	17/15.9	.28	8X
12	DTK Quin-55M/PM233	Pentium MMX-233	32	512	3.1	Diamond Stealth 3D 3000	4/VRAM	17/15.7	.28	12X
13	Gateway 2000 G6-266XL	Pentium II-266	64	512	9	STB Virge Gx	4/EDO DRAM	21/19.7	.28	9X
14	Digitron PS4000	Pentium II-266	32	512	4.3	STB Velocity 3D Video	4/VRAM	17/16.1	.25	16X
15	Nova K6-200TX	AMD K6-PR200	64	512	4.1	Matrox Millennium	4/WRAM	17/15.7	.28	12X
16	Acma EXP 200	Pentium MMX-200	32	512	3.2	Matrox Millennium II	4/WRAM	17/15.9	.25	12X
17	CLR Infinity PT5-A 200MMX	Pentium MMX-200	32	512	3.2	Number Nine Imagine 128 Series II	4/VRAM	17/15.7	.28	16X
18	HP Vectra VA 6/200 MT	Pentium Pro-200	32	256	2.5	Matrox Millennium II	2/WRAM	17/15.7	.28	8X
19	Total Peripherals Archer 2000A	Pentium MMX-200	32	512	4.1	Matrox Millennium	4/WRAM	17/15.5	.28	18X
20	IBM PC 365	Pentium Pro-200	32	256	2.1	Matrox Millennium II	4/WRAM	17/15.7	.28	6X

* Best Buy [1] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology. [2] Six years on CPU and main RAM, one to five years on other parts. [3] First year. [4] Toll call.

33.6-kbps modem has been replaced with a 56-kbps unit using 3Com's U.S. Robotics x2 spec. The gigantic 6.4GB EIDE hard disk and 3D–savvy Matrox Millennium II graphics card with 8MB of WRAM are both outstanding, and the internal Iomega Zip drive comes with three 100MB cartridges.

The M233s is equipped with 32MB of SDRAM and 512K of secondary cache. The Altec Lansing ACS 90 speakers produce rich sound, while the 17-inch monitor will please the eyes with its display.

We liked the case design of the XPS M233s. You won't mistake the panel's reset button for an on/off switch. Color-coded I/O ports make monitor and mouse installations quick and easy, while undoing a single thumbscrew allows quick access. The PC's interior is clean and free of clutter. The motherboard sports a pair of Universal Serial Bus ports, though the system doesn't come with any compliant peripherals. The software bundle includes Microsoft Office 97 Small Business Edition, plus Publisher and Photo Editor.

If the XPS M233s has any drawback, it is lack of expandability. RAM is limited to a maximum of 64MB—a once unheard-of amount that could become mainstream.

Dell's documentation is top-notch, and technical support is available 24 hours a day. The warranty covers parts for three years and labor for one year, and our readers consistently rate Dell's service and system reliability in a class by itself.

Gateway 2000 G6-233

3 GATEWAY 2000 G6-233

PRO: Fast, excellent documentation, nice design

CON: Drive bays can be tough to access

At $2839, Gateway 2000's G6-233 is a terrific performance-minded value. With a PC WorldBench score of 251, the fleet-footed Pentium II-233 minitower rivals some PII-266 systems in performance, and it comes well appointed with 64MB of EDO DRAM and 512K of secondary cache. This powerful multimedia system is a good choice for both home and business use.

Our test unit came with a 16-bit Ensoniq Audio PCI Wavetable sound card, Altec Lansing speakers with a subwoofer, and an

		EXPANDABILITY						CUSTOMER SUPPORT			
Modem speed (kbps)	Sound board	Case style	Max. RAM (MB)	Maximum secondary cache (K)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
56 [1]	Iintegrated Yamaha OPL3-Sax	minitower	128	512	2	2/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	integrated	minitower	64	512	1	2/2	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	Ensoniq Audio PCI Wavetable	minitower	256	512	2	3/2	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	integrated	desktop	512	512	3	1/0	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [1]	Ensoniq Audio PCI Wavetable	minitower	256	512	1	3/2	0	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	integrated Yamaha OPL3-Sax	tower	128	512	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
33.6	Creative Labs Vibra 16s	desktop	512	512	3	1/1	•3	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	Creative Labs CT 3600 (OEM)	minitower	384	512	4	1/1	4	3/3	9	–	WWW
33.6	Sound Blaster AWE32 PnP	minitower	768	512	4	3/2	4	varies [2]/1	24 [3]	Sat., Sun.	–
33.6	Ensoniq Soundscape Vivo PnP	minitower	128	256	0	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
–	Sound Blaster AWE32 PnP	tower	1024	512	3	2/0	5	3/3	9	–	BBS, WWW
56 [1]	Sound Blaster AWE64	tower	256	512	2	3/2	3	2/2	9	–	BBS, WWW
56 [1]	Ensoniq Audio PCI	tower	256	512	2	2/1	1	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	Sound Blaster AWE64 CT4380	minitower	1024	512	6	3/1	4	1/1	9	Sat.	WWW
33.6	Sound Blaster AWE64	minitower	256	512	5	3/0	4	3/3	8	–	WWW
33.6	integrated	minitower	128	512	2	1/1	4	3/1	10	–	BBS, WWW
33.6	Sound Blaster AWE64	minitower	128	512	2	2/0	4	3/3	12	Sat.	WWW
–	Sound Blaster PnP	minitower	192	256	4	2/1	4	3/3	11 [4]	–	AOL, BBS, CIS, WWW
33.6	Sound Blaster 32 PnP	minitower	128	512	4	3/0	4	3/1	9	–	BBS, WWW
–	–	desktop	512	256	3	0/1	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, WWW

STB Virge 4MB 3D PCI graphics card. The 3.2MB Ultra-DMA hard drive spins at twice the top data transfer rate of standard EIDE drives, while a 56-kbps x2 modem provides fast data communications.

Our unit had plenty of expansion room. Large thumbscrews make getting inside the case very easy, and we liked the color-coded I/O ports. Drawbacks are minor: We had to undo thumbscrews on the case's right side panel to remove the drive cages, and the hard disk occupies the most accessible of the internal bays.

Gateway 2000's documentation is thorough and clear. Our readers rank the company's system reliability as only fair, but support gets top scores: You get a three-year warranty on parts and labor, plus round-the-clock toll-free tech support.

4 DELL OPTIPLEX GXI 5200M

PRO: Fast; above-average service, support, and system reliability

CON: Expensive, limited expandability

The $3112 OptiPlex GXi 5200M remains expensive when compared to most of the Pentium MMX-200 competition. But this corporate desktop has everything you need in a high-end business box—snappy performance, bountiful storage, built-in networking, and great support. The D1728D-LS monitor isn't Dell's top 17-inch model; but for an extra $100, you can move up to a 17HS Trinitron, which displays even sharper text and provides more on-screen controls.

Dell OptiPlex GXi 5200M

The GXi 5200M is particularly well designed. Expansion slots sit on a daughtercard above the motherboard; we found plugging cards into the slots as painless as it gets. Our only beefs: With just one available external drive bay, one free 32-bit slot, and two 16-bit slots, the expansion options are a bit tight. In addition, the 8X CD-ROM drive is slower than most.

As with all systems in the OptiPlex line, Dell's support for the GXi 5200M is great. You get a three-year warranty on parts and one year on labor, and Dell continues to run up top marks for service quality and system reliability in our monthly reader fax-back surveys. ▶

5 GATEWAY 2000 G5-233

PRO: Loaded, affordable, good support

CON: Poor display, some wires left unconnected, system reliability rated only fair

Gateway 2000's G5-233 sports a stylish chassis and a $170 price cut. This Pentium MMX-233 minitower posted a PC WorldBench score of 240, yet costs just $2508 for a loaded multimedia configuration. The G5-233 comes outfitted with a fast 16X CD-ROM drive, as well as an Ensoniq Audio PCI Wavetable sound card, speakers, and Microsoft Office 97 Small Business Edition. While the 56-kbps Gateway 2000 Telepath x2 modem provides the potential for swift downloads, be aware that your Internet service provider must use the matching 3Com/U.S. Robotics protocol for this modem to have any advantage over 33.6-kbps units.

Gateway 2000 G5-233

The 17-inch CrystalScan 700 display provides a generous 16-inch viewable area, but our test PC's monitor suffered from a less-than-sharp picture that bowed outward at the top and bottom. Gateway also includes a speedy 4MB STB Virge graphics card with 3D acceleration for exciting game play. ▶

TOP 20 POWER DESKTOPS — TEST REPORT

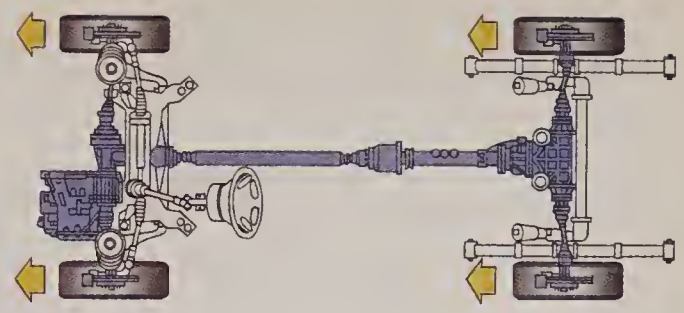
	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	Dell Dimension XPS H266*	Pentium II-266	32	512	263
2	Dell Dimension XPS M233s*	Pentium MMX-233	32	512	243
3	Gateway 2000 G6-233*	Pentium II-233	64	512	251
4	Dell OptiPlex GXi 5200M*	Pentium MMX-200	32	512	226
5	Gateway 2000 G5-233*	Pentium MMX-233	32	512	240
6	Quantex QP6/233 SM-3	Pentium II-233	32	512	247
7	Dell OptiPlex GXpro 200	Pentium Pro-200	32	512	230
8	NMC Expert Pro II	Pentium II-266	64	512	260
9	Sys Technology Performance Pro 266A	Pentium II-266	32	512	264
10	Quantex QP6/200 SM-4	Pentium Pro-200	32	256	230
11	Premio FX2 Shadowhawk 266	Pentium II-266	64	512	257
12	DTK Quin-55M/PM233	Pentium MMX-233	32	512	238
13	Gateway 2000 G6-266XL	Pentium II-266	64	512	263
14	Digitron PS4000	Pentium II-266	32	512	259
15	Nova K6-200TX	AMD K6-PR200	64	512	238
16	Acma EXP 200	Pentium MMX-200	32	512	233
17	CLR Infinity PT5-A 200MMX	Pentium MMX-200	32	512	229
18	HP Vectra VA 6/200 MT	Pentium Pro-200	32	256	229
19	Total Peripherals Archer 2000A	Pentium MMX-200	32	512	237
20	IBM PC 365	Pentium Pro-200	32	256	232

*Best Buy

Word 7.0 for Windows 95 · Excel 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · Paradox 5.0 for Windows · WordPerfect 6.1 for Windows · 1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

Gloves, maps and such can go in Caravan's tilt-out glove box. And some models have handy front door pockets for additional storage.



Caravan's available all-wheel-drive system features an inter-axle viscous coupling that automatically gives more torque to the rear wheels as needed.

When we redesigned Caravan we rounded the corners for a more aerodynamic shape, and still found a way to get 32 more cubic feet of room over the previous model.

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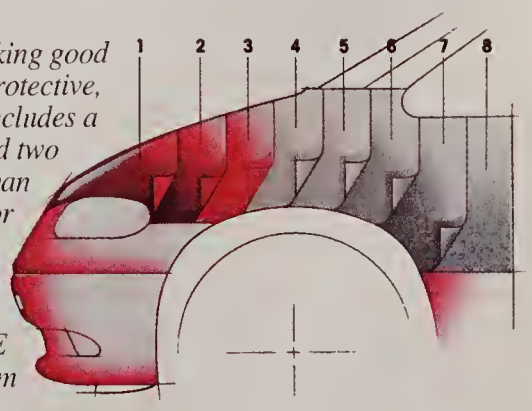

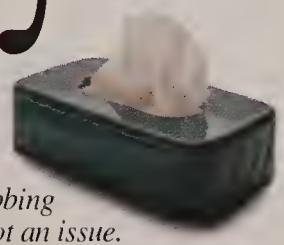

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Caravan The New Dodge

The G5-233 is nicely constructed, and the case shows little flex—though we were surprised to find that wires going from the sound card to the modem and CD-ROM drive had been left unconnected. Gateway includes a comfortable keyboard and Microsoft's Intellipoint mouse, which has a small wheel between its buttons to let you scroll documents and Web pages with one finger.

Gateway's service and support are top-flight. Besides the three-year limited warranty on parts and labor, you get round-the-clock phone support and a year of free on-site service. In our fax-back surveys, Gateway scores a less impressive fair rating for system reliability.

New This Month

The following PCs made our Power Desktops chart for the first time this month. For brief reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

9 SYS TECHNOLOGY PERFORMANCE PRO 266A

PRO: Breakneck speed, colossal hard drive, good speakers, tidy interior

CON: No bundled apps, subpar support policies, thin documentation

Sys Technology consistently builds some of the fastest systems we've reviewed, and the new Performance Pro 266A is no exception. This well-appointed Pentium II-266 minitower set a new PC WorldBench performance record, with a score of 264 (a distinction it shares with the Unicent Avanta 266 XLS, which failed to make the cut on our Power Desktops chart this month). Still, for $3249, buyers might expect a little more polish and at least a few applications.

Performance Pro 266A

The new *PC World* speed champ comes with the kind of hardware you'd expect from a powerhouse PC. It features a big 6.4GB hard disk—an Ultra-DMA/ATA IDE drive that transfers data to and from devices quickly, which can be especially useful for running demanding multimedia applications. The Performance Pro's savvy multimedia setup includes a fast 16X CD-ROM drive, Creative Labs' Sound Blaster AWE32 audio board, and a pair of MLi 818 speakers that produce crisp, robust sound. The communications features aren't bad, either: a Cardinal 33.6-kbps modem and FaxTalk Plus software. The Number Nine Revolution 3D graphics board with 8MB of WRAM drives bright, color-rich images to the system's 17-inch Sys Technology monitor.

Overall, the Performance Pro 266A is nicely designed. We found the Windows 95 keyboard comfortable to use, if a bit on the flimsy side. We also noticed that the case has *two* power switches—one on the front for standard on/off operation, and another in the rear that must be set to "on" for the front switch to function—a potentially confusing setup. The case itself is somewhat difficult to remove, but once it was off we found a very tidy interior. The motherboard allows easy access to the four free SIMM sockets, three ISA slots, one PCI slot, and five drive bays.

Unfortunately, the Performance Pro lacks a software bundle—you'll need to supply your own office suite and other applications. The included documentation could be better, too. The Performance Pro comes with a mess of booklets—one for each component—as well as a generic user manual for Windows 95.

We have very little information on the quality of Sys Technology's support or the overall reliability of its products. When we tried calling the company's support line, we had trouble getting through to a technician; and once we did, we felt rushed off the phone. The Performance Pro 266A's warranty isn't the best in town, either: Labor and on-site service are free for one year only, and the parts warranty varies by component—six years for the CPU and main RAM, and one to five years for other components. You get round-the-clock, toll-free technical support for the first year, but thereafter it's abruptly reduced to 9 hours per weekday, on your dime.

11 PREMIO FX2 SHADOWHAWK 266

PRO: Very fast, comes with 64MB of RAM, outputs video to a TV or VCR

CON: No modem, poor documentation, slow CD-ROM drive, no software

Premio's top-of-the-line FX2 Shadowhawk 266 costs just $2779, yet racked up an impressive PC WorldBench score of 257. Just be prepared to fill in a few gaps: This fast Pentium II-266 PC lacks basics like a modem or a software bundle.

Premio FX2 Shadowhawk 266

The Shadowhawk comes with a generous 64MB of RAM, but the 3.2GB hard disk is somewhat smaller than average for high-end desktops. The ATI 3D Pro Turbo PC2TV video card includes a port that feeds video directly to your TV or VCR for playback or recording. The 17-inch Sceptre monitor puts the power switch on the side instead of in front, so you won't mistake it for a screen control. The Sound Blaster AWE32 card provides terrific wavetable MIDI sound and is compatible with DOS games, but the MLi 691H speakers could use more bass.

You'll need to pay extra for a modem to connect to the Internet, and the slow 8X CD-ROM drive failed to impress us. What's more, we were unable to play an audio CD because the PC lacked an internal audio cable to connect the CD-ROM drive to the sound card.

Home-office users will be disappointed with the software bundle: There is none. And while the charcoal-gray tower chassis looks nice enough, Premio loses style points for mating it with a putty-beige monitor. The case is tough to remove, but the interior is clutter-free, allowing easy access to the PC's three open DIMM sockets, two free PCI slots, two ISA card slots, and one shared space for a PCI or ISA card. Drive bays are a bit of a squeeze, though, with only two extra bays available (one 3.5-inch and one 5.25-inch). Also, the keyboard feels flimsy, making it slightly uncomfortable to use.

Premio lets component makers supply the documentation—a problem for those looking for a neat, integrated manual. We lack enough responses from our ▶

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monthly fax-back survey to rate Premio's service, but our calls to tech support turned up only fair results. We reached representatives within minutes but got less-than-perfect answers to our questions. Support hours are short—9 hours per weekday. Though Premio's three-year parts and labor warranty is good, on-site service costs an extra $50 for the first year.

13 GATEWAY 2000 G6-266XL

PRO: Ultrafast, crammed with features, big display and hard drive, excellent support

CON: Very expensive, bulky, only one free slot, reliability record is only fair

Gateway 2000 didn't waste any time in equipping its PCs with DVD-ROM drives, the latest in hot consumer-electronics technologies. The company's top-of-the-line G6-266XL is one of the first DVD-equipped systems to appear in our Top 20 reviews. But at $5128, this hulking tower is no particular bargain.

Gateway 2000 G6-266XL

Setting aside the gee-whiz factor, our tests show that the G6-266XL's DVD setup isn't quite ready for prime time: The two movies we played on it (*Twister* and *Batman*) had great full-screen resolution, but we also noticed that there was too much jitter and that patches were jaggy and pixelated. Gateway 2000 attributes these problems to driver software, and video quality may improve markedly by the time you read this. Still, there isn't much in the way of DVD software available right now—Gateway's bundle includes only the two movies we played in our tests, plus a coupon for another DVD film (a $25 value). Our conclusion: Systems with DVD don't yet hold a huge advantage over PCs equipped with standard CD-ROM drives. Of course, the G6-266XL's steep price doesn't help, either.

To be sure, the G6-266XL has a dreamy power configuration by almost anyone's standard. It's one of the fastest PCs you can buy, outpaced only by Sys Technology's ninth-place Performance Pro 266A and the Unicent Avanta 266 XLS, which didn't make the chart.

Graphic artists will love the G6-266XL's big, crisp 21-inch Trinitron monitor and the potent performance combination of a 266-MHz Pentium II processor, 64MB of RAM, and a 4MB STB Virge Gx graphics card. The capacious 9GB SCSI hard disk is among the largest we've ever seen. The G6-266XL also includes a 56-kbps x2-compatible modem with voice and fax mailbox software, as well as Microsoft Office Small Business Edition. Its high-capacity tape backup drive uses 4GB Travan cartridges and is a welcome, if rare, feature in the Top 20. Rounding out this system's features is an excellent speaker/subwoofer setup: The MicroMedia speakers from Boston Acoustics are among the best we've heard—and certainly the best for their compact size.

Unfortunately, the incredibly pricey G6-266XL will remain just a dream for most PC shoppers. It may also be too big for many offices, with its 2-foot-tall tower case and a 21-inch monitor that's a good 3 to 4 inches larger on all sides than a 17-inch model. Surprisingly, expansion is limited: Extras like the SCSI adapter and dedicated DVD media processor board leave only a single 16-bit ISA slot free, and no open PCI slots. Just three bays are available for drive upgrades.

Gateway provides ample support for the G6-266XL. Documentation is extensive and easy to read, and support policies are excellent, including a three-year warranty on parts and labor and round-the-clock toll-free tech support. While Gateway's system reliability is still garnering only a fair rating from our readers these days, the company's support record nevertheless draws high praise.

We'll be keeping a close eye on the G6-266XL and other DVD-equipped PCs. For now, you'd likely use its Toshiba DVD-ROM drive only for playing CD-ROMs (it runs at 9X), but Gateway says it's working to improve the drivers to smooth out the video. The improvements will be welcome, since the G6-266XL's roomy monitor is actually larger than many TV screens and can display the DVD images at a higher resolution.

14 DIGITRON PS4000

PRO: Great performance, nice monitor

CON: Expensive, only a one-year warranty

Newcomer Digitron breaks into the Top 20 with the PS4000, a feature-laden Pentium II-266 minitower that scored 259 in our PC WorldBench test suite. While it's no bargain at $3999, its features make it suitable for use as a network or Web server.

The PS4000 comes with an integrated Ultra-Wide SCSI connection and a RAID-Bus slot to add a low-cost RAID card for drive mirroring. A fast 4.3GB Seagate ST34501W Cheetah Ultra-Wide SCSI hard drive rotates at a blistering 10,000 rpm. Expandability is good, with four free drive bays and four open card slots. Digitron includes a Cirque keyboard with a front-right–mounted touchpad—good for working in cramped spaces.

The 17-inch MAG InnoVision DX700T display has a crisp, undistorted picture and a large 16.1-inch viewable area. The STB Velocity 3D Video card with 4MB of VRAM handles resolutions up to 1024 by 768 at 24-bit color. The PC even *sounds* good, with a terrific Sound Blaster AWE64 card and Nakamichi SP-D3 speakers with subwoofer. The PS4000's 16X CD-ROM drive is standard for power desktops these days. The software bundle includes Lotus SmartSuite 97 and Compton's Interactive Encyclopedia.

Digitron PS4000

Digitron's documentation is well written, but the support policies are spartan. There's only one year of coverage on parts and labor. Technical phone support is available just 9 hours each weekday, as well as limited hours on Saturday. We have no fax-back survey data on Digitron's service and reliability record. ▶

Beyond the Top 20

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Power Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcsnaps).

- **Unicent Avanta 266 XLS**
- **Seanix CS DVD 200**
- **Digital Celebris GL-2 6266**
- **IBM PC 300 GL**
- **Packard Bell Platinum 2250x**

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PC WORLD

TOP 20 BUDGET DESKTOPS

	SYSTEMS	Last month	Month tested	Street price (7/16/97)	CPU	Comments
1	Dell Dimension M200a 800/388-8542 www.dell.com	2	June 97	$1829	Pentium MMX-200	$270 off quick, well-rounded PC with top reliability and service rating.
2	Quantex QP5/200 SM1 MMX 800/896-4898 www.quantex.com	–	NEW	$1849	Pentium MMX-200	Very fast PC for under $2000; reliability rating needs improvement.
3	Gateway 2000 G5-166 M 800/846-2000 www.gateway.com	5	Aug 97	$1899	Pentium MMX-166	$35 price slide on multimedia PC; 17-inch monitor isn't Gateway's best.
4	Quantex QP6/200 PD-4 800/896-4898 www.quantex.com	13	Feb 97	$2399	Pentium Pro-200	Very fast, loads of software, improved service score; $60 less but still pricey.
5	Polywell Poly 500QX 800/999-1278 www.polywell.com	11	June 97	$1295	AMD K5-PR166	Bargain PC features full multimedia, good warranty; $100 less.
6	Micro Express MicroFlex-K5/5166 800/989-9900 www.microexpress.net	6	Aug 97	$1299	AMD K5-PR166	Low-cost generic PC is $50 cheaper, one of the fastest for under $1500.
7	CyberMax Power Max 800/437-4596 www.cybmax.com	9	Sep 97	$1599	AMD K6-PR166	Fast, low-cost AMD K6 tower drops $50; support available around the clock.
8	USA Flex Performer 800/872-3539 www.usaflex.com	–	NEW	$1999	Cx6x86MX-PR200	Cyrix-based PC is one of the fastest on chart; reliability unknown.
9	Micro Express MicroFlex-PR/233 800/989-9900 www.microexpress.net	12	Sep 97	$1849	AMD K6-PR233	233-MHz system is fastest K6 by far; good design but no software.
10	Kingdom Pentium MMX 200 Home & Office 800/385-3436 www.kingdomcomputers.com	20	July 97	$1997	Pentium MMX-200	$300 price slash moves this loaded multimedia minitower up the chart.
11	ProGen Atlas X 200 800/776-9595 www.progen.com	15	Aug 97	$1729	Pentium MMX-200	Fleet-footed, $70 off, speakers with subwoofer; no weekend support.
12	Micro Express MicroFlex-P5/MMX 800/989-9900 www.microexpress.net	–	Sep 97	$1699	Pentium MMX-200	Fast, well-designed PMMX-200 drops $200; display is a little fuzzy.
13	Kingdom 6x86 P166+ Super Value 800/385-3436 www.kingdomcomputers.com	16	May 97	$1197	Cx6x86-P166+	$50 price shave, decent performance, great price; no modem.
14	CyberMax Intel Promax 3 P200 MMX 800/437-4596 www.cybmax.com	–	June 97	$1749	Pentium MMX-200	$350 price cut puts fast, well-outfitted multimedia machine on the chart.
15	Micro Express MicroFlex-686/P200+LC 800/989-9900 www.microexpress.net	18	Aug 97	$1799	Cx6x86-P200+	Quick and affordable, with multimedia, 4GB hard disk, good sound card.
16	Nexar MMX P-200 888/639-2772 www.nexarpc.com	–	July 97	$1659	Pentium MMX-200	$240 drop puts easily upgradable PC on chart; meager support policies.
17	Micro Express MicroFlex-PCI/5200 800/989-9900 www.microexpress.net	–	Feb 97	$1799	Pentium-200	Good performance for the money, especially if you don't need MMX.
18	Polywell Poly 5200Mx 800/999-1278 www.polywell.com	–	May 97	$1785	Pentium MMX-200	Fast PC hits the chart with $265 drop; limited data on system reliability.
19	Royal Computer Synergy Best Buy 800/486-0008 www.royalcomp.com	–	Sep 97	$1799	Pentium MMX-200	Speedy, low-cost minitower with good features but thin support policies.
20	ProGen Discover MPEG P166 888/776-9595 www.progen.com	–	Mar 97	$1149	Pentium-166	Least expensive PC on the chart; performance is decent.

Best Buy See features chart, page 258; performance chart, page 260. Recommended as home system

[1] Insufficient data.

THE QUANTEX QP5/200 SM1 MMX soars to a number two Best Buy, combining excellent features, good support, and a strong PC WorldBench score of 230 in an attractively priced $1849 package. Budget buyers should prepare themselves for a Pentium II invasion in coming months. The QP5/200 SM1 MMX's sibling, the Quantex QP6/266 WS-3x, nearly made the budget chart by combining a PC WorldBench score of 255 (performance that's comparable to a Pentium II-266 PC's) with a reasonable $2499 price. A Quantex Pentium II-233 system now on the Power Desktops chart—the QP6/233 SM-3 reviewed in September—is also poised to break into the budget ranks.

SCORECARD

★ Overall rating	Price	Vendor's system reliability	Features and design	PC WorldBench score/performance	Vendor's support quality/policies	Reader service number
88	average	best	very good	219/very good	best/best	687
84	average	fair	very good	230/very good	best/best	688
82	average	fair	very good	213/very good	best/best	689
81	expensive	fair	outstanding	235/outstanding	best/best	690
81	inexpensive	[1]	good	213/very good	[1]/good	691
81	inexpensive	[1]	very good	208/good	[1]/best	692
81	average	[1]	very good	223/very good	[1]/best	693
79	average	[1]	outstanding	235/outstanding	[1]/best	694
79	average	[1]	very good	246/outstanding	[1]/best	695
79	average	[1]	outstanding	233/outstanding	[1]/good	696
78	average	[1]	very good	232/outstanding	[1]/fair	697
78	average	[1]	good	232/outstanding	[1]/best	698
78	very inexpensive	[1]	good	197/good	[1]/good	699
78	average	[1]	very good	229/very good	[1]/best	700
77	average	[1]	very good	217/very good	[1]/best	701
77	average	[1]	very good	228/very good	[1]/poor	702
77	average	[1]	very good	219/very good	[1]/best	703
76	average	[1]	good	234/outstanding	[1]/good	704
76	average	[1]	very good	226/very good	[1]/poor	705
76	very inexpensive	[1]	good	196/good	[1]/fair	706
Scorecard weightings ▶	Price 25 percent	Reliability 25 percent	Features 20 percent	Performance 15 percent	Support 15 percent	All products: 907

This Month's Best Buys

1 DELL DIMENSION M200A

PRO: Inexpensive for a PMMX-200, excellent support, modem uggraded to 56 kbps

CON: Monitor a little dull

The Dell Dimension M200a takes over the top spot now that Dell has discontinued its Dimension XPS M166s, the only machine that scored ahead of it since the M200a arrived in June. With a PC WorldBench score of 219, this MMX-200 minitower is only slightly faster than the average PMMX-166, but its affordable $1829 price (down $270 from last month) makes it a terrific value.

The M200a now features two upgrades: a faster 12X/24X variable-speed CD-ROM drive and a 3Com/U.S. Robotics x2 56-kbps modem that has become standard issue on all Dimension desktops. With its Microsoft Office Small Business Edition software bundle, the M200a is a good no-nonsense choice for the home or small office. However, we found that the 15-inch LS monitor included with our test unit lacked sharpness (upgrading to the basic 17-inch Dell display costs an extra $175).

Dell Dimension M200a

The Dimension M200a's clean interior makes the system easy to upgrade. Dell's documentation is complete with illustrations, index, and glossary; we just wish it were integrated into one book. Of course, the company's support and system reliability ratings are superb—tops among all vendors, according to *PC World*'s readers.

2 QUANTEX QP5/200 SM1 MMX

PRO: Fast, affordable

CON: No speakers, reliability rated just fair

Quantex's QP5/200 SM1 MMX delivers better-than-average Pentium MMX-200 performance to the Budget Desktops chart, scoring a commendable 230 on our PC WorldBench test suite. At just $1849, this multimedia minitower costs about $300 less than the average for its processor class.

The QP5/200 comes with the impressive Matrox Mystique video adapter—a fixture on our Top 10 Graphics Boards charts—loaded with 4MB of fast SGRAM. You also get Matrox's Rainbow Runner video capture and TV tuner module. The 15-inch MAG InnoVision monitor provides good viewing. Audio is handled by a 16-bit Ensoniq sound card, but Quantex doesn't throw in speakers. A speedy 16X CD-ROM drive keeps pace with the latest applications and games.

As with other Quantex systems we've seen, the QP5/200's case is sturdy and the interior designed for expandability. Despite a few twisting cables haphazardly bundled in our test unit's chassis, the five open drive bays (three external and two internal) were easy to reach. You'll have to lift up the cables to snap in additional ▶

TOP 20 BUDGET DESKTOPS — STANDARD FEATURES

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	Screen pitch (mm)	CD-ROM drive speed
1	Dell Dimension M200a*	Pentium MMX-200	16	512	2.1	integrated	2/DRAM	15/13.8	.28	24X
2	Quantex QP5/200 SM1 MMX*	Pentium MMX-200	32	512	3.2	Matrox Mystique 220	4/SGRAM	15/13.9	.28	16X
3	Gateway 2000 G5-166 M*	Pentium MMX-166	16	512	1.3	integrated	2/EDO DRAM	17/16.1	.28	16X
4	Quantex QP6/200 PD-4*	Pentium Pro-200	32	256	3.2	Matrox Millennium	2/WRAM	17/16	.28	12X
5	Polywell Poly 500QX*	AMD K5-PR166	32	512	2.5	Diamond Stealth 3D 2000	2/EDO DRAM	15/13.8	.28	12X
6	Micro Express MicroFlex-K5/5166	AMD K5-PR166	32	512	2.1	ATI PC2TV	2/WRAM	15/13.8	.28	10X
7	CyberMax Power Max	AMD K6-PR166	32	512	3.2	Matrox Mystique 220	4/SGRAM	15/13.8	.28	16X
8	USA Flex Performer	Cx6x86MX-PR200	32	512	4.1	Matrox Millennium	4/WRAM	17/16.1	.28	16X
9	Micro Express MicroFlex-PR/233	AMD K6-PR233	64	512	2	STB Velocity 3D Video	4/VRAM	17/15.8	.26	12X
10	Kingdom Pentium MMX 200 Home & Office	Pentium MMX-200	32	512	3.2	Hercules Dynamite 128	4/MDRAM	17/15.8	.28	16X
11	ProGen Atlas X 200	Pentium MMX-200	32	512	3.2	Matrox Millennium	4/WRAM	17/15.8	.26	16X
12	Micro Express MicroFlex-P5/MMX	Pentium MMX-200	32	256	2	STB Velocity 3D Video	4/VRAM	17/15.6	.28	12X
13	Kingdom 6x86 P166+ Super Value	Cx6x86-P166+	16	256	2.1	PCI-60V	2/EDO DRAM	15/13.8	.28	16X
14	CyberMax Intel Promax 3 P200 MMX	Pentium MMX-200	32	512	3.2	Diamond Stealth 3D 2000	4/EDO DRAM	17/15.8	.28	12X
15	Micro Express MicroFlex-686/P200+LC	Cx6x86-P200+	32	512	4	STB Velocity 3D Video	4/VRAM	17/15.8	.28	12X
16	Nexar MMX P-200	Pentium MMX-200	32	512	2.5	Diamond Stealth 3D 2000	2/EDO DRAM	15/13.8	.28	12X
17	Micro Express MicroFlex-PCI/5200	Pentium-200	32	512	2.1	STB Lightspeed 128	2/MDRAM	17/16	.28	10X
18	Polywell Poly 5200Mx	Pentium MMX-200	32	512	2.1	Diamond Stealth 3D 2000	4/EDO DRAM	17/15.8	.28	8X
19	Royal Computer Synergy Best Buy	Pentium MMX-200	32	512	2.5	ATI All-in-Wonder	4/DRAM	17/16	.26	12X
20	ProGen Discover MPEG P166	Pentium-166	16	512	1.6	Matrox Millennium	2/WRAM	15/14	.27	12X

* Best Buy [1] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology. [2] Downloads only, uploads at 33.6 kbps; uses Rockwell/Lucent's K56flex technology.

RAM on the bottom DIMM socket, but empty adapter slots sit in the clear.

Software includes Microsoft Office 97 Small Business Edition and a selection of Windows 95 games, including Demolition Derby, a car-racing game on CD-ROM. The QP5/200's 56-kbps faxmodem, which uses the K56flex standard from Rockwell/Lucent, offers the potential for swift Internet downloads.

Quantex QP5/200 SM1 MMX

Quantex produced an adequate manual with serviceable illustrations, but following its jargon can get pretty difficult. Fortunately, the company's tech support staff is accessible through a toll-free number around the clock. Our anonymous calls got responses within 5 minutes and revealed a friendly and patient staff. In our fax-back surveys, readers also give Quantex high scores for support, though they rate system reliability as only fair. The QP5/200 SM1 MMX comes with an industry-standard warranty that covers parts for three years and labor for one.

3 GATEWAY 2000 G5-166 M

PRO: Excellent internal design, 17-inch display, good software bundle

CON: System reliability rated only fair

Gateway 2000's G5-166 M moves up to third place from fifth last month. While the G5-166 M is no speed demon—its PC WorldBench score of 213 puts it among the slower PCs on the chart—Gateway outfits this minitower with everything you need for communications and multimedia. The result: A PC that's ready for home or office.

What's more, the well-designed G5-166 M is getting more affordable. It now costs just $1899, despite a loaded configuration that includes a CrystalScan 17-inch monitor, 2MB of integrated video, a 16-bit sound card, and a 16X CD-ROM drive. The Telepath 56-kbps modem conforms to the 3Com/U.S. Robotics x2 standard, and there is a set of Altec Lansing speakers. The 1.3GB hard drive could get cramped.

The G5-166 M benefits from Gateway's attractive yet sensible case design. With its softened edges, the PC avoids the utilitarian look of those cookie-cutter boxes, and the interior is easily accessible by twisting

Modem speed (kbps)	Sound board	EXPANDABILITY: Case style	Max. RAM (MB)	Maximum secondary cache (K)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	CUSTOMER SUPPORT: Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
56 [1]	Sound Blaster 16	minitower	64	512	1	3/1	6	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56 [2]	Ensoniq Audio S5016	minitower	256	512	4	3/2	5	3/1	24	Sat., Sun.	BBS, WWW
56 [1]	integrated	minitower	128	512	1	3/2	5	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	Ensoniq Soundscape Vivo 90	minitower	256	512	2	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
33.6	Supersound Origins 3D CS32	minitower	128	512	4	3/0	4	3/5	12	Sat.	BBS, WWW
33.6	Superior Sound32	minitower	128	512	4	3/2	3	4/4	24	Sat., Sun.	WWW
33.6	Ensoniq Audio PCI Wavetable	tower	384	512	5	3/2	5	3/1	24	Sat., Sun.	BBS, WWW
56 [1]	Ensoniq Audio PCI 971B	minitower	256	512	4	3/1	3	3/3	24	Sat., Sun.	BBS, WWW
33.6	Ensoniq Audio PCI Wavetable	tower	256	512	1	3/0	3	4/4	24	Sat., Sun.	WWW
33.6	Schubert 3D	minitower	128	512	4	3/3	4	3/1	13	Sat.	WWW
33.6	Progen AWE 32 PnP 3D	minitower	256	512	4	3/1	4	3/1	9	–	BBS, WWW
33.6	Super Sound 32W-3D	minitower	256	512	5	3/1	3	4/4	24	Sat., Sun.	WWW
–	Schubert 3D	tower	128	512	3	3/3	5	3/1	13	Sat.	WWW
33.6	Ensoniq Soundscape Vivo 90	minitower	128	512	0	3/2	4	3/1	24	Sat., Sun.	BBS, WWW
33.6	Sound Blaster AWE64	minitower	512	512	2	2/3	3	4/4	24	Sat., Sun.	WWW
33.6	Televideo Telesound 3D	minitower	128	512	2	1/1	4	3/1	12	–	BBS, WWW
28.8	Opti 941	minitower	256	512	4	2/3	3	4/4	24	Sat., Sun.	WWW
33.6	Sound Blaster 16 IDE PnP	minitower	128	512	5	3/0	5	3/5	24	Sat., Sun.	BBS, WWW
33.6	ESS ES186BF PnP Audio Drive	minitower	128	512	3	3/0	3	1/1	10	Sat., Sun.	BBS, WWW
33.6	ESS/6868PnP	minitower	128	512	2	3/1	4	3/1	9	–	BBS, WWW

thumbscrews. Although the front panel's on/off switch and reset buttons are unlabeled, the I/O ports in back are color-coded.

If you need to upgrade or add a component to the G5-166 M, swapping ISA or PCI cards shouldn't be a problem: The interior is one of the cleanest we've seen, with everything well organized for easy access. The cables are neatly bundled, so you won't have to push them aside to add memory, and nothing obstructs the adapter slots. All of the drive bay screws and rails are placed so you can get at them without contortion, though the installed hard drive does take up the most accessible bay.

Gateway 2000 G5-166 M

One of Gateway 2000's strengths has always been its documentation, and the materials bundled with the G5-166 M are no exception. And the helpful, friendly on-screen "tour guide" kept us focused and moved us along to the information we needed. In addition, the company integrates its material very well with the vendor-supplied component manuals.

The software is another strong point—Gateway bundles both business and home-oriented applications. Encarta 97, Microsoft Office 97 Small Business Edition, and Street Plus (which helps you locate virtually any address in the United States) are all included. Gateway also throws in a few titles, like The Human Body 2.0, that take advantage of MMX.

Our readers rate Gateway 2000's system reliability as only fair, but hail its support as among the best.

4 QUANTEX QP6/200 PD-4

PRO: Fast performance, 17-inch monitor, improved support quality

CON: Expensive, no MMX support

The only Pentium Pro system on the Budget Desktops chart, the Quantex QP6/200 PD-4 jumps into Best Buy position thanks in part to the company's much-improved support record. At $2399, the QP6/200 PD-4 may not seem like a bargain—unless you're looking for top performance. This Pentium Pro-200 minitower racked up a terrific PC WorldBench score of 235. ▶

making it among the three fastest systems on the chart.

The PD-4 is a good computer for both home and office. You get a generous 3.2GB hard disk and a 17-inch MAG InnoVision monitor that delivers particularly crisp images in its 16 inches of viewing area. However, the Matrox Millennium graphics card comes with only 2MB of WRAM, which limits your choice of resolutions and color settings. A 12X CD-ROM drive and an Ensoniq Vivo 90 sound card complete the multimedia picture.

Quantex QP6/200 PD-4

The system's interior is uncluttered, with four free expansion slots and six open drive bays. Access to all memory and adapter slots is easy, and the ports along the back are clearly labeled and accessible. The software bundle will keep home users busy for a while: You get WordPerfect 7, Quicken, Compton's Interactive Encyclopedia 1996, and other titles.

The QP6/200 PD-4 will appeal to anyone using Windows NT, since the system's Pentium Pro CPU is heavily optimized to NT's 32-bit code. But because the processor lacks support for the MMX instruction set, some newer home-oriented titles may not run on this system. ▶

TOP 20 BUDGET DESKTOPS — TEST REPORT

	SYSTEMS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	Dell Dimension M200a*	Pentium MMX-200	16	512	219
2	Quantex QP5/200 SM1 MMX*	Pentium MMX-200	32	512	230
3	Gateway 2000 G5-166 M*	Pentium MMX-166	16	512	213
4	Quantex QP6/200 PD-4*	Pentium Pro-200	32	256	235
5	Polywell Poly 500QX*	AMD K5-PR166	32	512	213
6	Micro Express MicroFlex-K5/5166	AMD K5-PR166	32	512	208
7	CyberMax Power Max	AMD K6-PR166	32	512	223
8	USA Flex Performer	Cx6x86MX-PR200	32	512	235
9	Micro Express MicroFlex-PR/233	AMD K6-PR233	64	512	246
10	Kingdom Pentium MMX 200 Home & Office	Pentium MMX-200	32	512	233
11	ProGen Atlas X 200	Pentium MMX-200	32	512	232
12	Micro Express MicroFlex-P5/MMX	Pentium MMX-200	32	256	232
13	Kingdom 6x86 P166+ Super Value	Cx6x86-P166+	16	256	197
14	CyberMax Intel Promax 3 P200 MMX	Pentium MMX-200	32	512	229
15	Micro Express MicroFlex-686/P200+LC	Cx6x86-P200+	32	512	217
16	Nexar MMX P-200	Pentium MMX-200	32	512	228
17	Micro Express MicroFlex-PCI/5200	Pentium-200	32	512	219
18	Polywell Poly 5200Mx	Pentium MMX-200	32	512	234
19	Royal Computer Synergy Best Buy	Pentium MMX-200	32	512	226
20	ProGen Discover MPEG P166	Pentium-166	16	512	196

*Best Buy

Word 7.0 for Windows 95
Excel 7.0 for Windows 95
Picture Publisher 6.0 for Windows 95
Paradox 5.0 for Windows
WordPerfect 6.1 for Windows
1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

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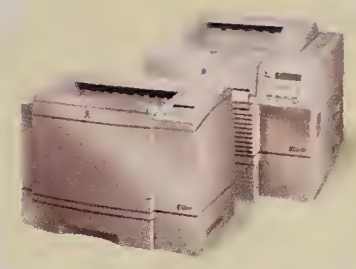

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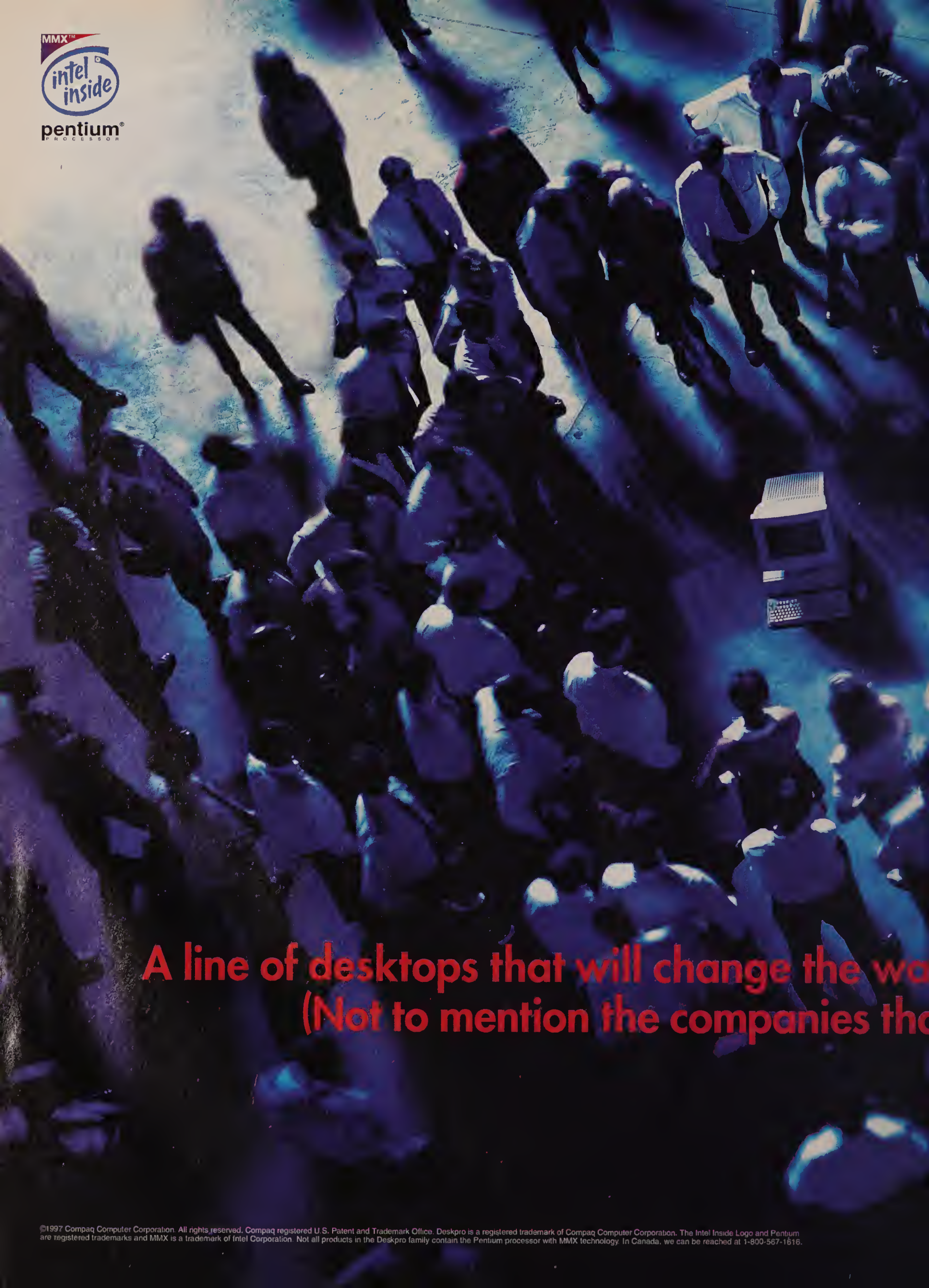

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Quantex's support policies are strong: You get a three-year warranty on parts and one year for labor, plus free on-site service for the first year and seven-days-a-week technical support. Our readers rate Quantex's record of support as among the best in the industry, a welcome improvement over its showing in past months. However, the company's system reliability score is still only fair.

5 POLYWELL POLY 500QX

PRO: Very low price, tidy interior, good home software bundle

CON: Performance is slow for its class, blurry monitor, poor keyboard

Polywell's Poly 500QX leads the non-Intel parade on the Budget Desktops chart this month. With its bargain-basement $1295 street price and competent performance, this AMD K5-PR166–based minitower is one the first systems without an Intel CPU to ever earn a Best Buy on *PC World*'s Top 20 Desktops charts.

While the Poly 500QX lacks some of the spit-and-polish we're used to seeing at the top of the charts, there's no denying the value of this low-cost multimedia PC. It turned in a PC WorldBench score of 213—identical to that of the Gateway 2000 G5-166 M, a Pentium MMX-166 system that sits at third place. A 2.5GB hard disk provides good storage for the Poly 500QX, and we liked the speaker set. There is also a 12X CD-ROM drive and a 33.6-kbps modem, and the home-oriented software bundle ranges from Microsoft Works to The Magic School Bus.

A Diamond Stealth 3D 2000 card provides good 3D graphics acceleration, but our test unit's 15-inch monitor displayed a blurry image. We also disliked the Keytronics keyboard, which seemed poorly designed with awkwardly sized keys.

Polywell Poly 500QX

The putty-colored Poly 500QX does have some interesting design touches, though—for example, the power button sits on a raised section of the chassis. Inside, we found plenty of room to maneuver, with four free card slots and four open SIMM sockets for easy upgrades. A fan produces a cross-breeze that cools down the processor.

Polywell provides decent support. The documentation—a fancy black affair that looks like it could be a Cadillac owner's manual—has both an index and a glossary but, oddly, doesn't cover basics like system setup. The warranty is one of the longest you'll find: It covers parts for three years and labor for five. Technical support lines are toll-free and open 12 hours per weekday and 8 hours on Saturday.

USA Flex Performer

New This Month

The following PCs made our Budget Desktops chart for the first time this month. For brief reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

8 USA FLEX PERFORMER

PRO: Great performance, affordable price, large software bundle

CON: RAM upgrades could be a challenge

Our Budget Desktops chart has been a battleground for new CPUs, with entries from Intel, AMD, and now Cyrix all skirmishing for a piece of the action. This month the Flex Performer from USA Flex carries the Cyrix banner into the fray, using a Cx6x86MX-PR200 processor to post an impressive PC WorldBench score of 235. This decked-out machine can take on even the best Pentium MMX-200 PCs, yet it costs just $1999—nearly $200 less than the average for PMMX-200 systems.

The Flex Performer's PR200 CPU actually runs at an efficient 150 MHz. Cyrix uses a large primary cache and sophisticated pipelining to eke out performance without increasing the clock speed. However, in tests performed for our August *Top of the News* section, MMX performance was mixed (see "Cyrix Powers $2100 Pentium II–Class PCs"). A 6x86MX-200 chip lagged behind the Pentium competition in our Adobe Photoshop, Fractal Design Ray Dream Studio, and Macromedia Director tests. It's something to keep in mind when you make a purchase decision.

The Flex Performer comes well appointed, with a sharp, 17-inch MAG InnoVision monitor mated with a 4MB Matrox Millennium graphics card. A pair of Altec Lansing ACS 250 speakers has enough wattage to fill even a large space with sound, while the Ensoniq Audio PCI card—Ensoniq cards are found in many Top 20 desktops—provides wavetable MIDI playback. USA Flex also includes a 3Com/U.S. Robotics 56-kbps modem, which means using an ISP that supports the x2 specification.

The generic, putty-colored Flex Performer isn't much to look at, but upgrades are simplified by the easy-open case and a relatively clean interior. Unfortunately, the stiff IDE cables block free access to the four available SIMM/DIMM sockets, so adding memory could be difficult.

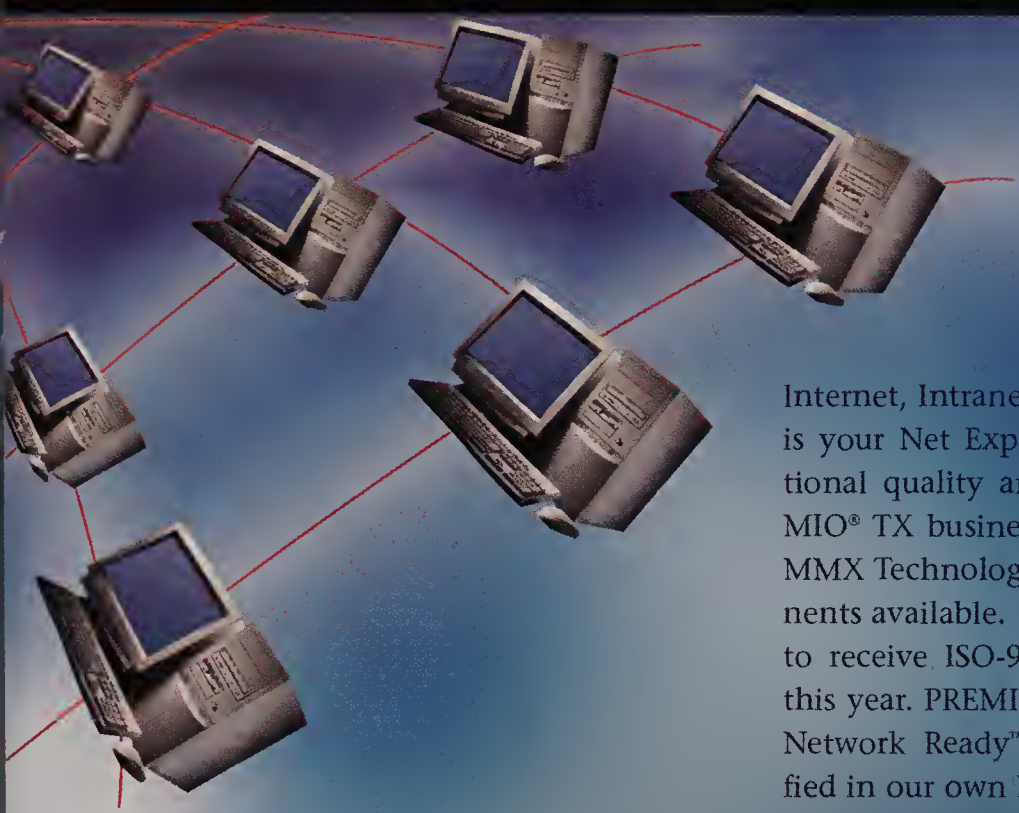
USA Flex pours on the software, with enough bundled applications and titles to keep you noodling around for hours. You'll find eleven CD-ROMs that address entertainment as well as productivity for both home and office. It may even be too much of a good thing: After all, how many dictionaries and encyclopedias do you really need?

The company's documentation is basic yet effective, but we prefer better integration than the separate, component-specific manuals that come with this system. USA Flex provides a strong three-year warranty on parts and labor, plus toll-free technical support 24 hours a day (weekends included). However, we don't have enough reader fax-back survey data to rate the company's system reliability or the quality of its support. ▶

Beyond the Top 20

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Budget Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcsnaps).

- **DirectWave Blue Thunder P133 MVP Pro**
- **DTK Quin-57M/PM233**
- **Quantex QP6/266 WS-3x**
- **TigerDirect AMD K6 233**



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STANDARD FEATURES

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256KB integrated L2 cache
Memory upgradable to 1GB (8 DIMM slots)
5 PCI, 2 ISA, 1 shared ISA/PCI, 9 drive bays
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MICRON VETIX MXI-N

Intel 200MHz Pentium Pro processors
64MB ECC EDO RAM
2GB Ultra-Wide SCSI-3 hard drives

STANDARD FEATURES

Dual Pentium Pro ZIF sockets
256KB integrated L2 cache
Memory upgradable to 1GB (8 DIMM slots)
8 open expansion slots: 5 PCI, 2 ISA, 1 shared ISA/PCI
Integrated Adaptec PCI Ultra-Wide SCSI-3 controller
Integrated Intel EtherExpress Pro 100 controller
12X variable speed SCSI CD-ROM
5 internal, hot-swappable, hard drive array bays (upgradable to 10)
3 external 5.25" media bays
1 (one) 330 watt power supply standard (upgradable to 3 for added redundancy)
Dedicated server technical support, 7x24
5-year/3-year Micron Power limited warranty
1-year next-business-day on-site service*

$4,699
Bus. lease $160/mo.

MICRON VETIX LXI

Intel 200MHz Pentium Pro processor
64MB ECC EDO RAM
4GB Ultra-Wide SCSI-3 hard drive

STANDARD FEATURES

Dual Pentium Pro ZIF sockets
256KB integrated L2 cache
Memory upgradable to 1GB (8 DIMM slots)
5 PCI, 2 ISA, 1 shared ISA/PCI, 9 drive bays
Integrated Adaptec PCI Ultra-Wide SCSI-3 controller
Integrated Intel EtherExpress™ Pro 100 controller
12X SCSI-2 CD-ROM drive
15" Micron 500FGx, .28dp(13.7" display)
Microsoft® Windows NT® Server 4.0 (10-user license)
Intel LANDesk® Server Manager 2.52
Dedicated server technical support, 7x24
5-year/3-year Micron Power limited warranty
1-year next-business-day on-site service*
NOS Support (3 incident resolutions/ 1st year), 7x24

$5,099
Bus. lease $1[illegible]

*On-site service for the Micron Vetix is provided by Digital Equipment Corporation and is optional.

NETWORK OPTIONS

3Com OfficeConnect Hub 8/TPC	$149	Sony 4/8GB SCSI DDS-2 tape backup drive with tape	$749
3Com OfficeConnect Switch 140	$969	Cheyenne ArcServe/InocuLAN-backup/antivirus	$499
APC Smart-UPS 700 with PowerChute plus software	$389	Novell IntranetWare 5-user licence (for LXI-N and MXI-N only)	$699

intel inside
PENTIUM PRO PROCESSOR

Powerful Pair.

Some things were meant to be together. Take our ClientPro PCs and Vetix servers. This powerful pair effortlessly gets your network running – and keeps it running.

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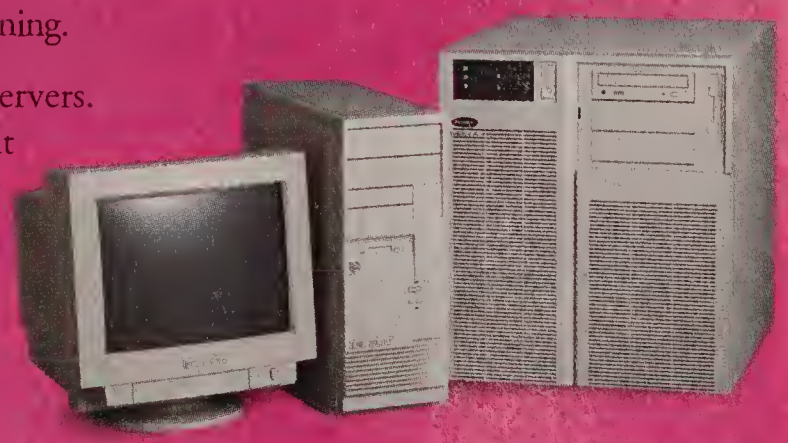

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Some things were meant to be together, all right. Like you and Micron.

MICRON CLIENTPRO® MTE

Intel 166MHz Pentium processor with MMX™ technology
32MB EDO RAM
2.1GB SMART EIDE hard drive
15" Micron 500FGx, .28dp (13.7" display)

STANDARD FEATURES

512KB pipeline burst cache, flash BIOS, DMI Support
3Com 3C905 network adapter
Integrated S3 ViRGE/DX graphics accelerator, 2MB EDO RAM
Integrated wavetable sound
Microsoft Intellimouse,™
Microsoft Windows® 95
Intel LANDesk Client Manager
5-year/3-year Micron Power limited warranty

$1,549
Bus. lease $53/mo.

MICRON POWER℠ WARRANTY

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3-year limited parts-only system warranty (1-year for TransPort VLX)
1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
30 days of free Micron-supplied software support for Micron desktop systems; 3 optional network operating system incident resolutions included for Micron server systems
30-day money back policy
24-hour technical support

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PC WORLD

TOP 20 NOTEBOOK PCs

	POWER NOTEBOOKS	Last month	Month tested	Street price (7/16/97)	CPU	Comments
1	WinBook FX 800/965-9349 www.winbook.com	1	Sept 97	$3999	Pentium MMX-166	Very fast multimedia notebook has 4BMB of RAM and true-color screen.
2	CTX EzBook 764MT 800/888-9052 www.ctxintl.com	3	Sept 97	$2999	Pentium MMX-166	A $250 cut pushes fast PMMX-166 into Best Buy territory; skimpy support.
3	Micron Transport XKE P166 A 800/393-8935 www.micronpc.com	2	Sept 97	$5149	Pentium MMX-166	Superfast, fully loaded, pricey; 6-hour battery, fast CD-ROM drive.
4	Dell Latitude LM M166ST 800/388-8542 www.dell.com	4	June 97	$3899	Pentium MMX-166	Speedy notebook boasts multimedia and nearly 6-hour battery life; no modem.
5	ArmNote TS97MX 800/765-1767 www.armcomputer.com	6	Sept 97	$2799	Pentium MMX-200	Fast PMMX-200 edges up with $200 cut; desktop CPU invites heat damage.
6	Transmonde Vibrant 166Tmx 888/988-2883 www.transmonde.com	5	Sept 97	$3699	Pentium MMX-166	Sturdy but heavy notebook really flies; support polices are thin.
7	Gateway 2000 Solo 9100 XL-166 800/846-2000 www.gateway.com	8	Sept 97	$5699	Pentium MMX-166	Tied for fastest notebook, but still very expensive even after $300 price cut.
8	Gateway 2000 Solo 2200 S5-166 800/846-2000 www.gateway.com	10	May 97	$39B9	Pentium MMX-166	Big $450 price drop moves speedy desktop replacement up two spots.
9	Gateway 2000 Solo 2100 S5-150 800/846-2000 www.gateway.com	9	Apr 97	$3399	Pentium MMX-150	Price is $350 lower this month on reasonably fast notebook.
10	WinBook LM 800/965-9349 www.winbook.com	7	May 97	$3199	Pentium-133	Last non-MMX power notebook hangs on; keyboard could be better.
	BUDGET NOTEBOOKS					
1	CTX EzBook 750MS 800/888-9052 www.ctxintl.com	6	Aug 97	$1799	Pentium MMX-150	$400 price drop vaults fastest budget notebook to top; short on support.
2	Compaq Armada 1520DM 800/345-1518 www.compaq.com	1	Aug 97	$2039	Pentium-133	Trim, dual-scan P-133 gets $160 price cut; great first notebook.
3	Toshiba Satellite Pro 430CDS 800/334-3445 www.computers.toshiba.com	2	July 97	$1699	Pentium-120	Great keyboard on well-designed but slow P-120.
4	Fujitsu LifeBook 420D 888/466-8434 www.fujitsu-pc.com	7	Sept 97	$1599	Pentium-120	$199 price cut on already cheap P-120 with great battery and ergonomics.
5	WinBook XP5 Pro P150 800/965-9349 www.winbook.com	3	June 97	$2599	Pentium-150	Fast notebook sports vivid active-matrix screen, modem, CD-ROM drive.
6	AMS TravelPro 105CS 800/886-2671 www.amstech.com	4	Sept 97	$1995	Pentium-150	Good performer, quick CD-ROM drive, long warranty; display lacks clarity.
7	Toshiba Satellite 200CDS 800/334-3445 www.computers.toshiba.com	5	July 97	$1299	Pentium-100	Entry-level corporate notebook is cheapest on chart, but it's dog-slow.
8	Gateway 2000 Solo 2100 S5-120 800/846-2000 www.gateway.com	10	Jan 97	$1899	Pentium-120	$200 price drop for fast notebook; short battery life.
9	Fujitsu LifeBook 435Dx 888/466-8434 www.fujitsu-pc.com	–	NEW	$1999	Pentium MMX-133	First PMMX-133 notebook has great performance, fine design; display is poor.
10	AcerNote Light 382 800/733-2237 www.acer.com/aac	–	July 97	$1799	Pentium-150	$200 cut puts very light notebook back on chart; poor reliability rating.

Best Buy See features chart, page 270; performance chart, page 272.

[1] Includes computer, adapter, power cord, floppy drive, and CD-ROM drive. May also include second battery, headphones, and other components supplied by vendor. [2] Insufficient data.

MORE GOOD DEALS AWAIT, as several vendors deliver big price breaks on their notebooks. The CTX EzBook 750MS jumped from sixth place to the top of the budget chart after the company sliced $400 off its price. But you'll still have to pay plenty for the biggest displays. We tested a couple of notebooks that pack fast Pentium MMX processors and roomy 13.3-inch active-matrix screens, but hefty weights and price tags kept them off the chart. The $5199 NEC Versa 6200MX, for example, tips the scales at 9.4 pounds; the AMS TravelPro 2010 CX166 is only somewhat easier to bear at 9 pounds and $4495.

SCORECARD

★ Overall rating	PC WorldBench score/ rating	Price	Vendor's system reliability	Features and design	Vendor's support quality/policies	Battery life (hours:min)/ rating	Traveling weight [1]	Reader service number
87	218/outstanding	average	average	outstanding	average/poor	4:26/good	heavy	707
86	217/outstanding	inexpensive	[2]	very good	[2]/poor	4:40/good	heavy	708
85	221/outstanding	very expensive	above average	very good	[2]/fair	6:17/outstanding	heavy	709
85	212/outstanding	average	average	very good	average/fair	5:52/very good	heavy	710
84	219/outstanding	very inexpensive	[2]	good	[2]/good	3:25/good	average	711
84	217/outstanding	average	average	outstanding	below average/poor	4:08/good	heavy	712
83	221/outstanding	very expensive	average	outstanding	below average/fair	5:30/very good	very heavy	713
83	218/outstanding	average	average	very good	below average/fair	3:46/good	average	714
83	199/very good	inexpensive	average	outstanding	below average/fair	3:12/good	average	715
83	182/good	inexpensive	average	good	average/poor	5:46/very good	average	716
Power scorecard weightings ▶	**Performance 22 percent**	**Price 14 percent**	**Reliability 22 percent**	**Features 16 percent**	**Support 10 percent**	**Battery life 8 percent**	**Weight 8 percent**	
81	198/outstanding	average	[2]	satisfactory	[2]/poor	4:21/good	average	717
81	151/good	average	average	good	above average/fair	3:39/good	average	718
79	141/good	inexpensive	average	satisfactory	below average/good	4:10/good	average	719
79	145/good	inexpensive	[2]	satisfactory	[2]/fair	4:50/very good	heavy	720
79	183/very good	expensive	average	very good	average/poor	3:24/good	average	721
79	168/very good	average	[2]	good	[2]/fair	3:44/good	heavy	722
79	91/poor	very inexpensive	average	satisfactory	below average/good	3:51/good	heavy	723
79	171/very good	average	average	satisfactory	below average/fair	2:15/satisfactory	average	724
78	191/very good	average	[2]	satisfactory	[2]/fair	3:42/good	heavy	725
78	170/very good	average	below average	good	[2]/fair	6:45/outstanding	average	726
Budget scorecard weightings ▶	**Performance 14 percent**	**Price 22 percent**	**Reliability 22 percent**	**Features 16 percent**	**Support 10 percent**	**Battery life 8 percent**	**Weight 8 percent**	**All products: 908**

POWER NOTEBOOKS

This Month's Best Buys

1 WINBOOK FX

PRO: Very fast, great display and documentation

CON: Pointing device had problems, weighty

You want speed, you crave power, but you can't imagine dropping $5000 for something you stuff into an airplane's overhead bin. Well, check out the WinBook FX, a fully loaded multimedia notebook that delivers breathtaking performance at a competitive price.

WinBook FX

The brilliant 12.1-inch active-matrix display is well protected by a sturdy screen casing, and the keyboard provides comfortable tactile feedback. But on the unit that we reviewed, we encountered problems with the eraser-head pointing device: Its tip came off when we tried to move the cursor around the screen, and it pushed down nearby keys when we pressed it hard to one side. ▶

TOP 20 NOTEBOOK PCs — STANDARD FEATURES

	POWER NOTEBOOKS	CPU	Traveling weight (pounds)[1]	RAM (MB)	Hard drive (GB)	Color screen type	Screen diagonal (inches)	Screen resolution	Maximum screen colors	Battery type	Pointing device
1	WinBook FX*	Pentium MMX-166	9	48	3	active	12.1	800 x 600	16.8 million	lithium ion	eraserhead
2	CTX EzBook 764MT*	Pentium MMX-166	9.4	40	1.4	active	12.1	800 x 600	16.8 million	NiMH	touchpad
3	Micron Transport XKE P166 A	Pentium MMX-166	10	32	3.1	active	13.3	1024 x 768	65,536	lithium ion	touchpad, eraserhead
4	Dell Latitude LM M166ST	Pentium MMX-166	9.2	40	2.2	active	12.1	800 x 600	65,536	lithium ion	touchpad
5	ArmNote TS97MX	Pentium MMX-200	8.4	32	2.1	active	12.1	800 x 600	65,536	lithium ion	touchpad
6	Transmonde Vibrant 166Tmx	Pentium MMX-166	10.4	48	3.1	active	12.1	800 x 600	65,536	NiMH	touchpad
7	Gateway 2000 Solo 9100 XL-166	Pentium MMX-166	10.4	64	3	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
8	Gateway 2000 Solo 2200 S5-166	Pentium MMX-166	8.8	40	2.2	active	12.1	800 x 600	65,536	lithium ion	touchpad
9	Gateway 2000 Solo 2100 S5-150	Pentium MMX-150	8.8	40	1.3	active	12.1	800 x 600	65,536	lithium ion	touchpad
10	WinBook LM	Pentium-133	8.6	16	1.1	active	12.1	800 x 600	65,536	lithium ion	touchpad
	BUDGET NOTEBOOKS										
1	CTX EzBook 750MS*	Pentium MMX-150	8.6	16	1.4	dual-scan	12.1	800 x 600	65,536	NiMH	touchpad
2	Compaq Armada 1520DM*	Pentium-133	7.8	16	1.1	dual-scan	11.3	800 x 600	65,536	lithium ion	touchpad
3	Toshiba Satellite Pro 430CDS	Pentium-120	8.8	16	1.4	dual-scan	11.3	800 x 600	65,536	lithium ion	eraserhead
4	Fujitsu LifeBook 420D	Pentium-120	9.2	16	1	passive	11.3	800 x 600	256	NiMH	touchpad
5	WinBook XP5 Pro P150	Pentium-150	8.4	16	1.1	active	11.3	800 x 600	256	lithium ion	eraserhead
6	AMS TravelPro 105CS	Pentium-150	9.2	16	1.3	dual-scan	12.1	800 x 600	256	NiMH	touchpad
7	Toshiba Satellite 200CDS	Pentium-100	9.2	8	.8	dual-scan	11.3	800 x 600	65,536	NiMH	eraserhead
8	Gateway 2000 Solo 2100 S5-120	Pentium-120	8.2	16	1.1	dual-scan	11.3	800 x 600	65,536	NiMH	touchpad
9	Fujitsu LifeBook 435Dx	Pentium MMX-133	9.2	16	1.3	dual-scan	12.1	800 x 600	256	NiMH	touchpad
10	AcerNote Light 382	Pentium-150	8.4	16	1.4	dual-scan	11.3	800 x 600	256	NiMH	touchpad

*Best Buy ● Yes ○ No [1] Includes computer, adapter, power cord, floppy drive, and CD-ROM drive. May also include second battery, headphones, and other components supplied by vendor.

The flaw is probably an aberration with our test unit, but we advise potential buyers to try out the pointer before purchase if possible.

Otherwise, the WinBook FX sped through our PC WorldBench suite, posting a score of 218 that puts it among the fastest notebooks we've ever tested. The FX comes equipped with an ample 48MB of EDO DRAM and a large 3GB hard disk. You also get a fast 10X CD-ROM drive and an internal 33.6-kbps modem.

The 9-pound WinBook FX is no lightweight, but its lithium ion battery ran nearly 4.5 hours in our tests, despite the notebook's bright display. WinBook provides well-illustrated manuals, but the company skimps on support. The one-year warranty is too short, and there is no guaranteed turnaround time for repairs from the factory.

2 CTX EZBOOK 764MT

PRO: Fast and inexpensive; nice display

CON: Heavy; slow CD-ROM drive; short warranty

Fast, sturdy, and good to look at, the $2999 EzBook 764MT from CTX leapfrogs Micron's Transport XKE P166 A to seize second place on the Power Notebooks chart. Behind the move: a steep $250 price cut that enhances the value of this fast Pentium MMX-166 notebook. With a PC WorldBench score of 217, the EzBook is in the performance elite, and it comes outfitted with a generous 40MB of RAM despite the low price.

CTX EzBook 764MT

The 12.1-inch active-matrix display is crisp but is no match for the 13.3-inch screens found on some higher-price notebooks. The EzBook is well equipped for multimedia, although the full-size headphones seem clumsy in comparison to inconspicuous Walkman-style phones, and the 8X CD-ROM drive is among the slowest on the Power Notebooks chart.

		EXPANDABILITY					CUSTOMER SUPPORT			
CD-ROM drive speed	Modem speed (kbps)	Maximum RAM (MB)	Modular expansion bays	Bay for second battery	Optional docking station	Infrared port	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
10X	33.6	80	1	●	●	●	1/1	13	Sat.	BBS, WWW
8X	33.6	72	2	●	●	●	1/1	9	–	WWW
20X	33.6	128	2	●	○	●	3/1	24	Sat., Sun.	CIS, WWW
10X	–	72	1	●	○	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
8X	33.6	80	0	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, WWW
8X	33.6	64	0	●	●	●	1/1	11	–	WWW
10X	33.6	192	2	●	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X	33.6	80	1	●	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X	33.6	40	1	●	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
6X	28.8	40	1	●	●	●	1/1	13	Sat.	BBS, WWW
6X	–	72	2	●	●	●	1/1	9	–	WWW
10X	33.6	64	1	●	○	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X	–	48	1	○	●	●	3/1	24	Sat., Sun.	BBS, CIS, WWW
10X	–	72	1	○	●	●	1/1	24	Sat., Sun.	WWW
8X	28.8	40	1	●	●	●	1/1	13	Sat.	BBS, WWW
10X	33.6	80	1	●	●	●	3/3	11	–	BBS, CIS, WWW
6X	–	40	1	○	●	●	3/1	24	Sat., Sun.	BBS, CIS, WWW
10X	–	40	1	●	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
10X	–	80	1	●	●	●	1/1	24	Sat., Sun.	WWW
10X	–	64	0	○	○	○	1/1	24	Sat., Sun.	BBS, WWW

The EzBook can take two nickel–metal-hydride batteries at once, but you must remove both the internal floppy and CD-ROM drives—there is no dedicated battery bay. The notebook lasted almost 4.75 hours on one battery in our rundown tests. The keyboard is comfortable, and the touchpad is well tuned. The whole package weighs a hefty 9.4 pounds.

The manual is thorough and well written, but CTX's service and support are still a question. Toll-free tech support is limited to weekday business hours. We lack data to rate CTX's system reliability; however, our phone calls to technical support indicate fairly accurate and timely problem resolution.

BUDGET NOTEBOOKS

This Month's Best Buys

1 CTX EZBOOK 750MS

PRO: Impressive speed, nice sound for notebook speakers, $400 price cut

CON: Meager warranty, lackluster dual-scan screen, weak documentation

Money talks. That's the lesson from CTX's EzBook 750MS, which shot to the top of the budget chart following a $400 price slash that makes it among the most affordable systems here. This Pentium MMX-150 portable costs just $1799, yet notched a PC WorldBench score of 198 that is slightly ahead of the average for its CPU class. The EzBook is also the fastest notebook on the Budget Notebooks chart.

You'll have to make a few sacrifices for this low-cost power. The EzBook's dual-scan display is among the dullest we've seen, making it inappropriate for presentations. We found the system's power switch tricky to use—it must be pushed especially hard and held down for too long. Also, the system's documentation is far too rudimentary.

On the upside, the EzBook's battery life was almost 4.5 hours in our tests, and the software bundle is a decent starter package that includes ClarisWorks, Microsoft Plus, and LapLink for Windows 95. ▶

For those who like to play, CTX throws in a game pad, and the built-in stereo speakers sound terrific. Another work-and-play plus: When you have the AC adapter plugged in, you can pull out the EzBook's battery and use both the floppy and CD-ROM drives—so you could, for example, listen to an audio CD while using the floppy drive for doing business.

CTX EzBook 750MS

Unfortunately, CTX's warranty is pretty thin, covering parts and labor for only one year; and toll-free tech support is available only 9 hours per weekday. We haven't yet received enough fax-back survey data from readers to rank the company's service and system reliability.

2 COMPAQ ARMADA 1520DM

PRO: Great all-in-one design requires no external power adapter; $160 price cut

CON: Middling Pentium-133 performance, short warranty, short battery life

With its Pentium-133 CPU and 11.3-inch dual-scan display, the $2039 Compaq Armada 1520DM is among the priciest notebooks on the budget chart. So how does it earn a ▶

TOP 20 NOTEBOOK PCs — TEST REPORT

	POWER NOTEBOOKS	CPU	RAM (MB)	Secondary cache (K)	PC WorldBench score
1	WinBook FX*	Pentium MMX-166	48	256	218
2	CTX EzBook 764MT*	Pentium MMX-166	40	256	217
3	Micron Transport XKE P166 A	Pentium MMX-166	32	512	221
4	Dell Latitude LM M166ST	Pentium MMX-166	40	256	212
5	ArmNote TS97MX	Pentium MMX-200	32	256	219
6	Transmonde Vibrant 166Tmx	Pentium MMX-166	48	256	217
7	Gateway 2000 Solo 9100 XL-166	Pentium MMX-166	64	256	221
8	Gateway 2000 Solo 2200 S5-166	Pentium MMX-166	40	256	218
9	Gateway 2000 Solo 2100 S5-150	Pentium MMX-150	40	256	199
10	WinBook LM	Pentium-133	16	256	182
	BUDGET NOTEBOOKS				
1	CTX EzBook 750MS*	Pentium MMX-150	16	256	198
2	Compaq Armada 1520DM*	Pentium-133	16	256	151
3	Toshiba Satellite Pro 430CDS	Pentium-120	16	–	141
4	Fujitsu LifeBook 420D	Pentium-120	16	–	145
5	WinBook XP5 Pro P150	Pentium-150	16	256	183
6	AMS TravelPro 105CS	Pentium-150	16	256	168
7	Toshiba Satellite 200CDS	Pentium-100	8	–	91
8	Gateway 2000 Solo 2100 S5-120	Pentium-120	16	256	171
9	Fujitsu LifeBook 435Dx	Pentium MMX-133	16	256	191
10	AcerNote Light 382	Pentium-150	16	256	170

*Best Buy

Word 7.0 for Windows 95 · Excel 7.0 for Windows 95 · Picture Publisher 6.0 for Windows 95 · Paradox 5.0 for Windows · WordPerfect 6.1 for Windows · 1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 colors. We run automated scripts on six popular business applications, performing common tasks such as spelling checks, scrolls, saves, sorts, and recalculations. The PC WorldBench score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

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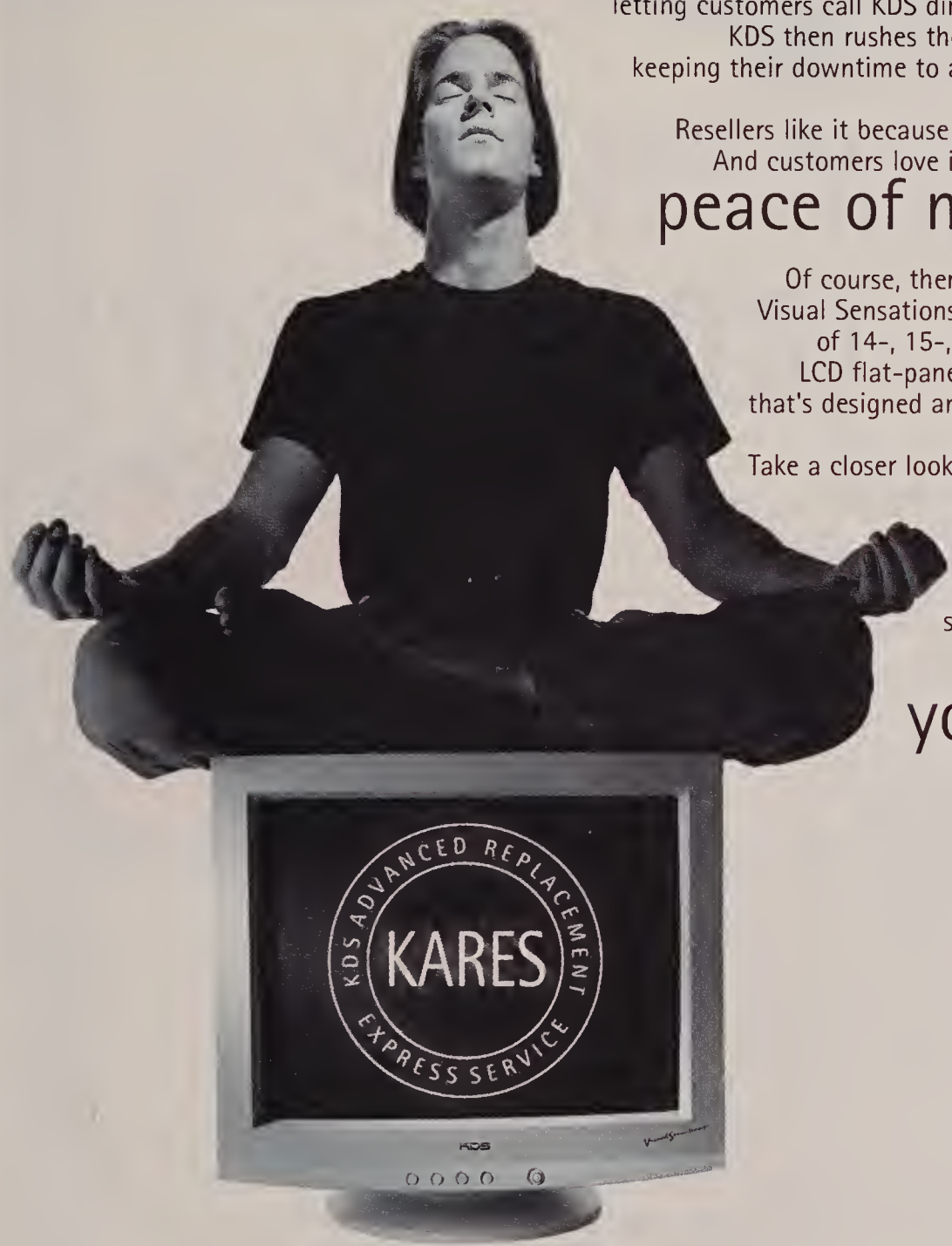

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Circle 170 on reader service card

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Best Buy? Simple: The Armada boasts one of the most innovative and convenient designs you can find in a notebook.

Compaq outfits the Armada with a 10X CD-ROM drive, a 33.6-kbps modem, and a 1.1GB hard drive. The 16-bit stereo sound system is terrific as well. And the PC WorldBench score of 151 is acceptable if you're not doing heavy number-crunching or fancy presentations.

Where the Armada pulls away from the pack is in its integrated, all-in-one design. The CD-ROM and floppy drives, and even the power supply, are built into the main unit. That means fewer loose components to forget or lug around. All you have to remember is the power cord—and not even that if you plan to work for less than 3.5 hours at a stretch, which is about how long the Armada's lithium ion battery ran in our tests. Even with all that's packed into it, the notebook travels at only 7.8 pounds—among the lightest on the chart.

Although preferences vary depending on the individual, we found the keyboard and touchpad to be easy to work with. The keyboard has a lively feel, and the touchpad is appropriately sensitive. The Armada's dual-scan display is typical—you get color, but next to an active-matrix screen it looks lifeless. And as with all dual-scans, you can't view the screen from much of an angle without losing the picture.

Compaq Armada 1520DM

The volume control of the system's stereo sound consists of two buttons (up and down) instead of the usual dial or sliding tab; press either button and you get a nice, audible click that corresponds to the setting increment.

The warranty is for only one year, but Compaq guarantees a two-day turnaround on factory repairs and provides round-the-clock toll-free support. According to readers responding to our fax-back survey, the company scores above average in support and average in system reliability. There have been reports in the industry press of trouble with Armada systems, though it's too early to assess whether this will affect our surveys of Compaq's reliability.

New This Month

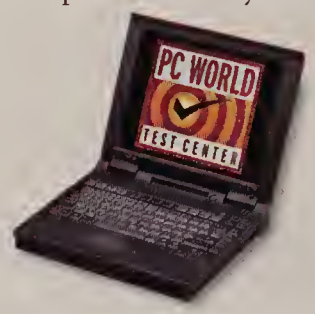
The following PC made our Budget Notebooks chart for the first time this month. For brief reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

9 FUJITSU LIFEBOOK 435DX

PRO: Very fast and solid, comfortable keyboard and mouse, 24-hour support

CON: Bulky, poor sound, dark dual-scan screen, no productivity programs

Sometimes you have to take a step backward to move ahead. That's the case with the Fujitsu LifeBook 435Dx. This no-frills corporate notebook provides fast performance at a bargain price—a potent combination. The secret: Intel's lowest-clock-speed mobile Pentium MMX processor yet, the PMMX-133.



Fujitsu LifeBook 435Dx

The $1999 LifeBook 435Dx is the first PMMX-133 notebook we've tested, and the results were impressive. Despite its slower clock speed, the LifeBook posted an impressive PC WorldBench score of 191—which is about as fast as the average PMMX-150 notebook. Also, it provides cost-effective access to the growing selection of MMX-enhanced software—a real concern for those who want to extend the life of their purchase.

The LifeBook is not only quick, it's enjoyable to use as well. The Windows 95 keyboard is comfortable to type on, even though the keys click a little too loudly. We found the pointing device easy to use, too, and especially liked being able to scroll through a document by sliding a finger up and down the touchpad's inside right edge. The LifeBook is well built, with little flex in the case or screen panel.

High performance, good ergonomics, and a solid case put the LifeBook onto our Top 20, but it falls well short of a Best Buy for a couple of reasons. The 12.1-inch dual-scan display is a little dark, and its colors lack vibrancy. We found the contrast control too finicky, and the brightness doesn't go very high. Also, it displays only 256 colors, while most notebook screens today—even dual-scans—offer over 65,000 colors. The upshot: Despite its MMX capability, the LifeBook isn't appropriate for business presentations.

The LifeBook's multimedia features are also a bit underwhelming. You get stereo speakers, but their sound is irritating even for a portable; unless you keep the volume way down, music seems as if it's coming out of a pair of tin cans. At 9.2 pounds, the LifeBook weighs a little more than average for a budget notebook, and it can't run both the internal floppy and CD-ROM drives simultaneously. While the modular bay does not allow hot swapping, you can run the floppy drive externally while the CD-ROM drive occupies the internal bay. Battery life is good at almost 3.75 hours, while the 1.3GB hard drive is standard these days. You'll have to pay extra for applications—the LifeBook lacks a software bundle.

Fujitsu generally does a good job of supporting its notebooks. The LifeBook's user guide is a little out of date (for example, it states that the CPU is a Pentium-120), but it's compact, easy to read, and well supported with diagrams. Numerous caution notes help novices steer clear of time-consuming errors.

Fujitsu's warranty lasts only one year, and the four-day guaranteed turnaround on repairs is longer than we'd like. However, phone support is available around the clock. We don't have enough fax-back survey results to report on Fujitsu's service and system reliability. ■

Beyond the Top 20

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Notebook PCs chart. For write-ups, see PC World Online (www.pcworld.com/t20pcsnaps).

- 5D Technologies 5D 9750 MMX166
- AMS TravelPro 2010 CX166
- ARM TS 9750
- Compaq Armada 1580 DMT
- IBM Thinkpad 380D
- NEC Versa 6050MH
- NEC Versa 6200MX
- Royal Mobile Best Buy MMX200
- Tiger GT 6x86-PR166+
- Transmonde Vibrant 133T
- WinBook XP5 Pro Dual-Scan 1GB

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*See store for mail-in rebate details

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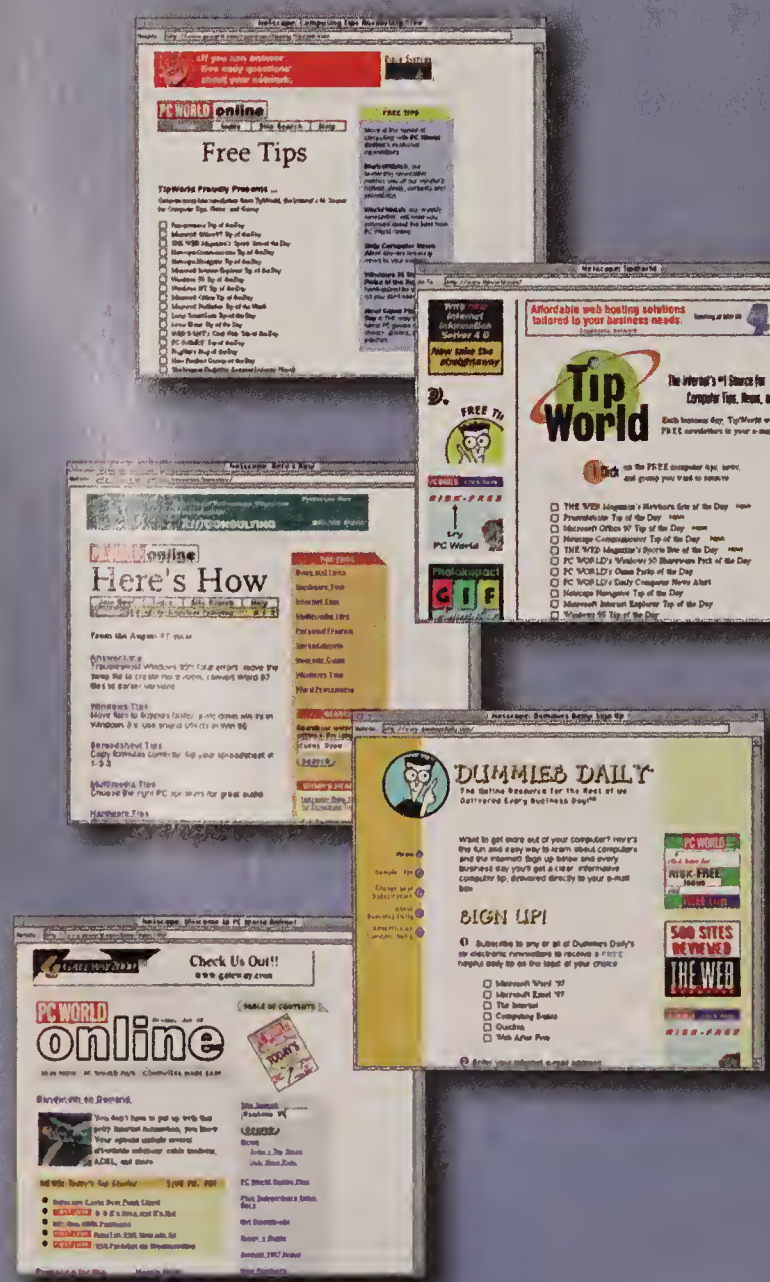

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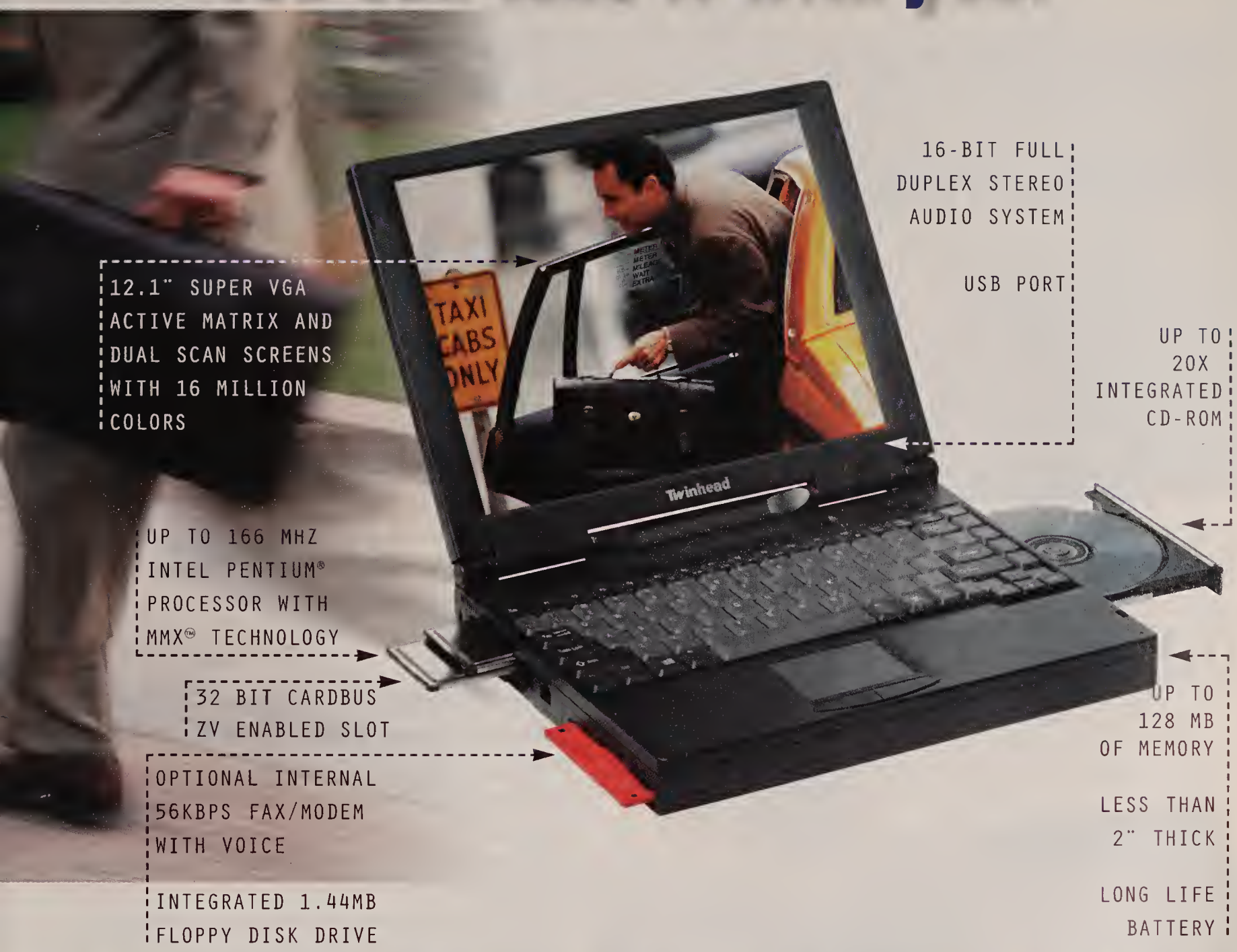

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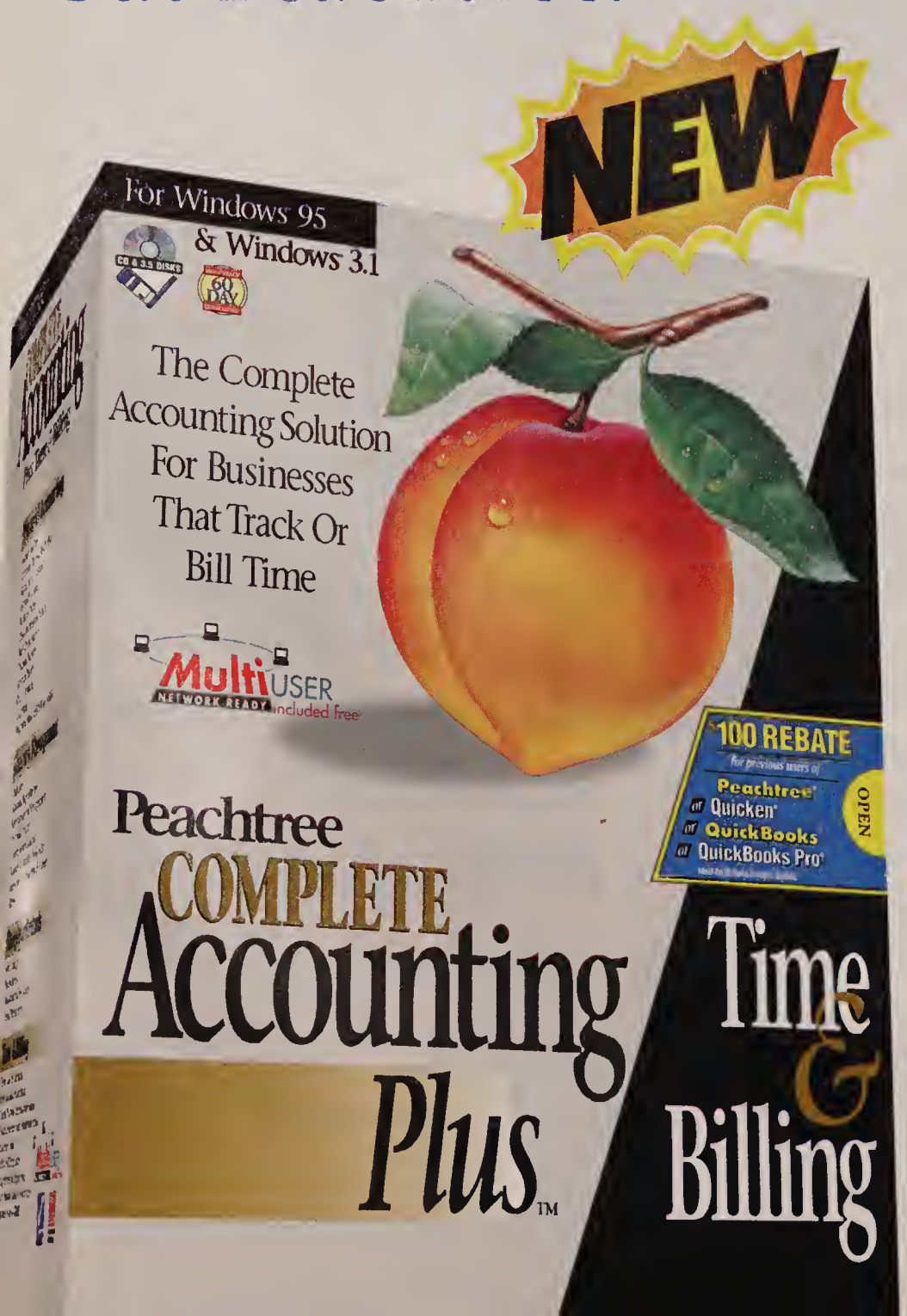

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Win a Dell Dimension M200a

Have you ever contacted your PC maker for service and support? Or has your PC been trouble-free? Tell us about it! Fill out and fax in the questionnaire below—even if you have no problems to report, and even if you have responded to this survey before—and we'll enter you in a drawing to win a Dell Dimension M200a, a Pentium MMX-200 PC in this month's Top 20. Send in a separate copy of the survey for each of your PCs.

HOW TO ENTER: FOR BEST RESULTS, PHOTOCOPY THIS PAGE. Fax your completed survey to 415/357-4522. Do NOT fax a cover page. Or mail it to *PC World*, Box 10-SS, c/o 800-SCAN, 543 Howard St., San Francisco, CA 94105-3013. Surveys must be received by October 31.
PRIZE: One entry per person. IDG employees and their families are not eligible. One prize will be awarded through a random drawing. *PC World* will make reasonable efforts to contact winners by telephone and fax. If *PC World* is unable to do so within 30 days of the drawing, a new winner will be selected. No purchase necessary. Void where prohibited by law.
HOW TO FILL OUT THE FORM: Print your name (block capital letters) and your fax number, and fill the circles for each digit of your daytime phone number. Then fill out the questionnaire. AVOID GOING OUTSIDE THE LINES!

LAST, FIRST NAME

FAX NUMBER

ZIP CODE

Please fill in your daytime phone number below.

1	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	○	○	○
6	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○
8	○	○	○	○	○	○	○	○	○	○
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How did you get this copy of *PC World*?
○ By subscription ○ On the newsstand ○ From someone else

ABOUT YOUR PC

Who is the manufacturer of the PC you use most frequently?

○ Acer ○ Acma ○ ALR ○ Apple ○ AST ○ Austin (IPC) ○ Compaq ○ Compudyne ○ Comtrade ○ CTX ○ CyberMax ○ Dell
○ Diamond ○ Digital (DEC) ○ DTK ○ EPS ○ Epson ○ Everex ○ Fujitsu ○ Future Tech ○ Gateway 2000 ○ Hewlett-Packard ○ HiO ○ Hitachi
○ Hyundai ○ IBM ○ Insight ○ Intelesys ○ Leading Edge ○ Micro Express ○ Micron ○ Midwest Micro ○ MIS ○ Nat'l Micro ○ NCR ○ NEC
○ Packard Bell ○ Panasonic ○ PerComp ○ Pionex ○ Polywell ○ Quantex ○ Robotech ○ Samsung ○ Sharp ○ Sony ○ Swan ○ Sys Tech.
○ Tangent ○ Texas Instruments ○ Toshiba ○ Twinhead ○ Unisys ○ USA Flex ○ Vektron ○ WinBook ○ Xi ○ Zenith (ZDS) ○ Zenon ○ Other

What size is this PC?
○ Desktop
○ Notebook/laptop

What is the CPU?
○ PowerPC ○ Pentium ○ Pentium Pro ○ Pentium MMX ○ Pentium II ○ Other _____
○ 6xB6 ○ 6xB6MX ○ MediaGX ○ K5 ○ K6

Where did you buy this PC?
○ Local dealer
○ Mail/phone order
○ Direct from field sales force
○ Membership discount store
○ Computer superstore
○ Home electronics store
○ Retail store
○ Value-added reseller
○ Other

After ordering, how long did it take to get your PC?
○ Less than 1 week
○ 1-2 weeks
○ 3-4 weeks
○ More than 4 weeks

Who set up your PC?
○ Dealer/retailer/VAR
○ Staff computer technician
○ Self or coworker

Where do you use this PC? ○ At home/home office ○ At work ○ Both

WHEN YOU FIRST GOT YOUR PC

When did you buy this PC? (Specify month and year.)

○ Jan ○ Feb ○ Mar ○ Apr ○ May ○ June ○ July ○ Aug ○ Sept ○ Oct ○ Nov ○ Dec
○ 92 ○ 93 ○ 94 ○ 95 ○ 96 ○ 97

When you first set up your PC, were any components "dead on arrival" (DOA)?
○ Yes ○ No ○ Don't know

If so, which component was it? (Mark all that apply.)
○ Battery ○ CD-ROM ○ CPU ○ Floppy drive
○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory
○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse
○ Power supply ○ Sound board ○ Other

Did your problem occur only after you added your own hardware or software?
○ Yes ○ No ○ Don't know

Would you buy this brand of PC again?
○ Yes ○ No ○ Not sure

How many times have you had a problem with this PC?
○ No problem ever ○ One ○ Two ○ Three ○ Four ○ More than four

If you have had a problem that you have not reported in a previous survey, please fill out the right column. If you are reporting a DOA for the first time, skip to the service section.

NEW PROBLEM REPORT

Answer for the most recent problem—*other than DOA*—not reported in a prior survey.

When did this problem occur? (Specify month and year.)

○ Jan ○ Feb ○ Mar ○ Apr ○ May ○ June ○ July ○ Aug ○ Sept ○ Oct ○ Nov ○ Dec
○ 92 ○ 93 ○ 94 ○ 95 ○ 96 ○ 97

How long after you purchased your PC did the problem occur?
○ Less than 1 month ○ 1-3 months ○ 4-6 months ○ 7-12 months ○ More than 12 months ○ Not sure

Did the problem occur as a result of adding new hardware or software?
○ Yes ○ No ○ Don't know

Did the problem occur under warranty?
○ Yes ○ No ○ Don't know

What was the problem finally identified as? (Mark all that apply.)
○ Faulty component ○ Incorrectly installed software ○ Wrong configuration ○ Faulty peripheral ○ Device conflicts ○ OS problem ○ Other ○ Don't know

If a component failed, which one was it? (Mark all that apply.)
○ Battery ○ CD-ROM ○ CPU ○ Floppy drive
○ Graphics/video board ○ Hard drive ○ Keyboard ○ Memory
○ Modem/fax board ○ Monitor/screen ○ Motherboard ○ Mouse
○ Power supply ○ Sound board ○ Other

SERVICE

Please use this section to describe the service and support you received for the problem reported above or the DOA reported at left.

Who fixed your PC?
○ Manufacturer
○ Dealer/store where purchased
○ Manufacturer's authorized repair technician
○ Self ○ Other

What types of service and support did you receive? (Mark all that apply.)
○ Phone ○ On site ○ In store
○ System swap ○ Component swap ○ Factory return

If you received phone service, how long were you on hold?
○ Not at all ○ Less than 1 minute ○ 1-2 minutes ○ 3-5 minutes ○ 6-10 minutes ○ 11-20 minutes ○ More than 20 minutes

How long did it take before you talked to the person who finally helped you?
○ Less than 15 minutes ○ 15 minutes-1 hour ○ 2-5 hours ○ 6-10 hours ○ 11-24 hours ○ 1½-2 days ○ 3-5 days ○ 1 week or more

How long did it take to resolve the problem completely?
○ 1-2 days ○ 3-7 days ○ 8-14 days ○ 15-30 days ○ More than 1 month ○ Never resolved ○ Awaiting resolution

Was it resolved to your satisfaction?
○ Yes ○ No

How would you rate the person(s) who helped you?

	Poor		Good		Excellent
Courtesy	○	○	○	○	○
Knowledge	○	○	○	○	○
Follow-through	○	○	○	○	○

Based on the service and support you received, would you buy this brand of PC again?
○ Yes ○ No

On the whole, how satisfied are you with the service and support you received?
○ Not at all ○ ○ Satisfied ○ ○ Extremely satisfied

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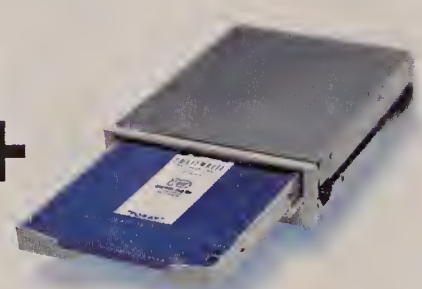

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PC WORLD

TOP 10 PRINTERS

	MONOCHROME PERSONAL PRINTERS	Month tested	Street price (7/15/97)	Overall rating	Speed for plain text (ppm)	Speed for full-page graphics (ppm)	Comments	Reader service number
1	HP LaserJet 6Lse 800/752-0900 www.hp.com	Aug 97	$399	80	5	1.8	**FEATURES:** 6-ppm laser. Standard 1MB of RAM, 600-by-600-dpi maximum resolution, 100 sheets input, 100 output. **PRO/CON:** Excellent print quality and paper handling, faster text speed than its predecessor the LaserJet 5L Xtra; still slowest on the monochrome chart, software bundle is not very useful.	737
2	Brother HL-720 800/827-6843 www.brother.com	June 97	$299	80	5.5	2.6	**FEATURES:** 6-ppm laser. Standard 512K of RAM, 600-by-600-dpi maximum resolution, 200 sheets input, 100 output. **PRO/CON:** Low price, fast graphics speed, good print quality, 200-sheet input tray among best on chart; not as easy to use as the HP LaserJet 6Lse, output tray takes up a lot of space.	738
3	NEC SuperScript 660plus 800/632-4636 www.nec.com	June 97	$299	79	5.1	2.5	**FEATURES:** 6-ppm laser. Standard 256K of RAM, 600-by-600-dpi maximum resolution, 150 sheets input, 100 output. **PRO/CON:** $50 off already low-price laser, good print quality and speed, includes parallel cable and two-year warranty; paper trays are flimsy, two-piece toner cartridge is hard to install.	739
4	NEC SuperScript 860 800/632-4636 www.nec.com	June 97	$399	79	7	2.4	**FEATURES:** 8-ppm laser. Standard 1MB of RAM, 600-by-600-dpi maximum resolution, 200 sheets input, 50 output. **PRO/CON:** Blistering text speed, easy controls for creating booklets and more, two-year warranty; gray-scale graphics are blotchy, pages collate in reverse order.	740
5	Panasonic KX-P6500 800/742-8086 www.panasonic.com	June 97	$399	78	5.6	2.3	**FEATURES:** 6-ppm laser. Standard 512K of RAM, 2400-by-600-dpi maximum resolution, 100 sheets input, 50 output. **PRO/CON:** Text and gray-scale print quality are very good thanks to the 2400-dpi resolution enhancement, tower design saves space; on-screen help lacks detail.	741
	COLOR PERSONAL PRINTERS							
1	Canon BJC-4300 800/848-4123 www.ccsi.canon.com	NEW	$199	83	1.9	0.3	**FEATURES:** 5-ppm monochrome/2-ppm color ink jet. 720-by-360-dpi maximum resolution, 100 sheets input and output. **PRO/CON:** Low price, prints fine on plain paper, very nice results on ink jet stock, great manual and software, easy to install and use; second-slowest printer on chart.	742
2	Epson Stylus Color 600 800/463-7766 www.epson.com	June 97	$299	81	2	0.6	**FEATURES:** 6-ppm monochrome/4-ppm color ink jet. 1440-by-720-dpi maximum resolution, 100 sheets input, 30 output. **PRO/CON:** Near-photo quality without special inks, easy installation, two-year warranty; mediocre text quality on plain paper, no manual feed slot for envelopes.	–
3	HP DeskJet 694C 800/752-0900 www.hp.com	June 97	$299	80	2.2	0.3	**FEATURES:** 3-ppm monochrome/0.8-ppm color ink jet. 600-by-600-dpi maximum resolution, 100 sheets input, 50 output, banner printing. **PRO/CON:** Easy to use, prints well on plain paper, software includes home and small office applications; printing photos requires special ink and paper.	743
4	HP DeskJet 820Cse 800/752-0900 www.hp.com	June 97	$299	79	4	0.3	**FEATURES:** 5-ppm monochrome/1.5-ppm color ink jet. 600-by-600-dpi maximum resolution, 150 sheets input, 50 output. **PRO/CON:** Near-laser text quality and speed, easy to use, includes Microsoft's excellent Publisher 97 desktop publishing app; color graphics look fine except for photos.	744
5	HP DeskJet 672C 800/752-0900 www.hp.com	Aug 97	$199	79	1.7	0.3	**FEATURES:** 2.5-ppm monochrome/0.8-ppm color ink jet. 600-by-600-dpi maximum resolution, 100 sheets input, 50 output. **PRO/CON:** Low price, prints well on plain paper, output tray lets pages dry before they fall, excellent manual; color quality is a little grainy, external power supply is bulky.	745

Best Buy For expanded reviews, visit www.pcworld.com/t10printers. Windows 95-certified Plug and Play All products: 909

HOW WE TEST The overall rating for both monochrome and color personal printers is based on print quality (25 percent), price (25 percent), features (15 percent), speed (10 percent), service and support (10 percent), and ease of use (15 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

A SLEW OF NEW COLOR INK JETS from Canon—ranging from a designer portable to a high-end model the company claims breaks new ground in plain-paper printing—is hitting store shelves. This month we tested four models in Canon's line: the portable $299 BJC-80; the high-end $449 BJC-7000, which primes plain paper with a coating to reduce bleeding; the $179 BJC-250, a bargain model that replaces the BJC-240; and ▶

the $199 BJC-4300, which replaces the BJC-4200 Photo that was number three on our color chart in August.

The best deal of the bunch is the BJC-4300, our new number one color Best Buy. It's easy to operate, produces nice prints, and is $100 cheaper than the number two Epson Stylus Color 600, which it knocks out of first place. Canon swung hard but struck out with the other three models we tested, due to poor print quality, slow speed, or high price.

Three other personal printers we reviewed this month did not fare well either. Lexmark's $399 Color Jetprinter 7000 and $449 Optra E+ monochrome laser are much too expensive for what they offer. We also looked at the DP-560, a new low-cost monochrome laser from market newcomer Mita. The DP-560 prints nice text, but this printer was only about half as fast as other 6-ppm lasers, which ruined its chances for making this month's chart. At press time we retested the DP-560 with new drivers, which sped it up dramatically—it now competes with some of the fastest monochrome lasers we've tested. Look for an updated review of this promising $279 printer in our December issue.

WINNING CANON

THE BJC-4300 isn't the fastest color personal printer you can buy. It prints color graphics at three-tenths of a page a minute—about average—and text at a little less than 2 ppm, making it the second-slowest model on the color chart. But this new Canon ink jet is still a terrific deal. At $199, it ties with Hewlett-Packard's number five DeskJet 672C for the lowest price on the chart, and it produces much nicer results. On plain paper, colors and text look better than the output from many other ink jets, including the DeskJet. On ink jet paper, gray-scale images, text, and color photos are especially attractive. The printer comes with an excellent setup guide, manual, and on-screen help, plus Canon Creative 3—a lavish, two-disc SOHO package that includes photo editing software and a greeting card creation program.

Tired of going without a printer on business trips? You might want to check out the $299 Canon BJC-80, a battery-run portable ink jet that fits neatly in a shoulder bag along with your notebook computer. The stylishly jet-black, 3.1-pound BJC-80 looks good and comes with an infrared port, which lets you print from any IR-equipped PC without cables. Just remember that you're paying for portability, not great speed or print quality. Like most portables (and like its nonmobile BJC-4300 sibling), the BJC-80 is on the slow side: It prints graphics at three-tenths of a page per minute and text at less than 2 ppm.

The BJC-80's text looks pretty nice, but lines come out jagged, regardless of the paper used. To get good color, you'll need to buy paper specifically intended for use with ink jet printers. These drawbacks, and the BJC-80's tiny cartridges (which poop out after only about 60 black-and-white pages), are what kept this portable off our chart.

CANON'S NEW BJC-4300 is a little slow, but its price, print quality, and friendly design make it our top color buy.

FAILED GIMMICK

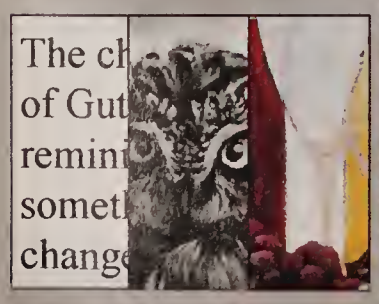
FOR THE TOP of its ink jet line, Canon developed an interesting—if not entirely successful—idea to improve plain-paper print quality. Before spraying inks, the BJC-7000 puts down a layer of clear, ink-solvent material intended to reduce bleeding, a common ink jet problem. However, it didn't seem to make much of a difference in our tests. On ink jet paper the BJC-7000's print quality is impressive, even spectacular, especially with text and color graphics. But on plain paper its results are only marginally better than with other ink jets. The $449 BJC-7000 is also very slow compared to other models in its price range: It chugs through text at only 2.3 ppm and graphics at 0.3 ppm.

At $179, the BJC-250 is at the bottom of Canon's new line, and it shows. It's slower than any of the color printers that made the chart, and it can take only one ink cartridge at a time—a design that most manufacturers are abandoning because it's inconvenient and results in greenish-looking black text in color documents. For only $20 more, you can get the Best Buy Canon BJC-4300, whose single-cartridge design includes a separate ink tank for true black text.

—*Dan Littman* ■

PRINT QUALITY SAMPLES

Canons Run the Gamut in Print Quality

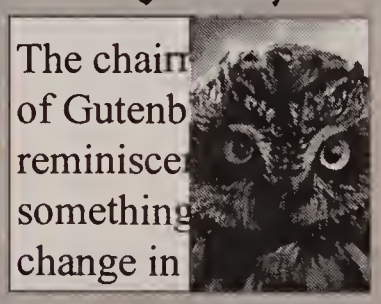


CANON BJC-4300

Our new color Best Buy, the $199 BJC-4300, does fine on plain paper, but photos and gray-scale images really shine on ink jet stock (shown here).

CANON BJC-80

Canon's new $299 portable needs ink jet paper to print nice gray-scale images and color photos. But lines come out jagged no matter what type of paper you use.



LEXMARK OPTRA E+

You can find cheaper, better monochrome printers than this new $449 laser from Lexmark. It prints crisp text, but gray-scale images tend to come out too dark.

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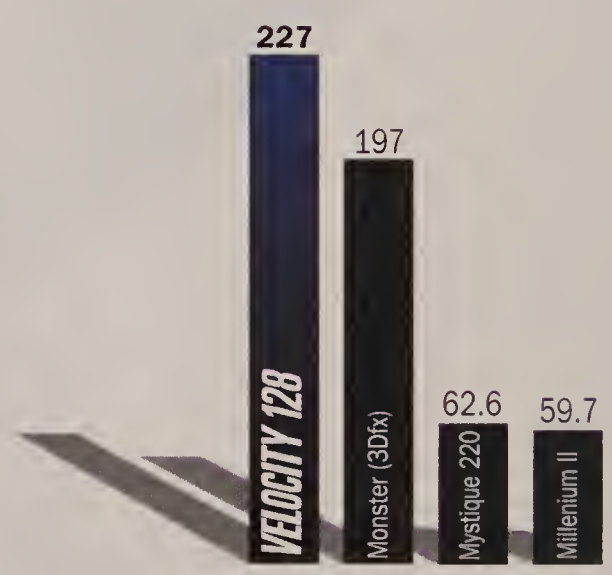

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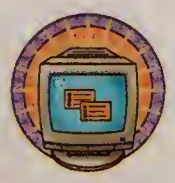
TOP 10 MONITORS

	15-INCH MONITORS	Month tested	Street price (7/20/97)	Overall rating	Quality of text/graphics	Comments	Reader service number
1	Panasonic PanaSync Pro P15 800/742-8086 www.panasonic.com/alive	retested this month	$349	83	very good/ excellent	**FEATURES:** 14-inch viewable area, .27mm dot pitch tube, up to 75-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free tech support. **PRO/CON:** Crisp text and best color graphics with unusually clear detail, large viewable area, easy-to-adjust on-screen controls; lacks a tilt control, generic appearance.	619
2	Mitsubishi Diamond Scan 15VX 800/843-2515 www.mitsubishi-display.com	retested this month	$350	83	very good/ very good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] image correction utility, three-year warranty, 8.5-hour weekday toll-free support. **PRO/CON:** Improved antireflective screen with terrific text and detailed graphics, ample plain-English menus; no tilt control.	620
3	Dell UltraScan 800HS 800/289-3355 www.dell.com	retested this month	$399	81	very good/ very good	**FEATURES:** 13.7-inch viewable area, .25mm stripe pitch Trinitron tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, 24-hour toll-free support. **PRO/CON:** Fine image quality, easily adjustable, drop-down door prevents accidental changes; brief one-year warranty, faint line across screen, expensive.	621
4	Nokia Multigraph 449Xa 800/296-6542 www.nokia.com	retested this month	$399	80	very good/ good	**FEATURES:** 13.6-inch viewable area, .25mm stripe pitch Trinitron tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] image adjustment utility, three-year warranty, 12-hour weekday toll-free support. **PRO/CON:** Very sharp text, speakers, handsome styling, very adjustable; relatively small viewable area, expensive.	622
5	Hitachi SuperScan Pro 500 800/441-4832 www.nsa-hitachi.com	retested this month	$349	80	good/ very good	**FEATURES:** 13.6-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 8-hour weekday toll-free support. **PRO/CON:** Good text, accurate color, realistic graphics; short support hours, fairly small viewable area, tedious button pressing to navigate on-screen menus.	623
6	Gateway 2000 CrystalScan 500 800/846-2000 www.gateway.com	retested this month	$305	80	very good/ good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 75-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free support. **PRO/CON:** $40 price drop, crisp text, liberal assortment of controls with door to protect against accidental changes; hard to tell what control buttons do in different modes.	624
7	Princeton Graphics Systems E050 800/747-6249 www.prgr.com	retested this month	$269	80	very good/ good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free support. **PRO/CON:** Great price, very sharp contemporary styling, well-defined text, ample assortment of controls; using basic controls takes too much button pushing.	625
8	Hansol 500P 888/426-7651 www.hansol-us.com	NEW	$269	79	good/ good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 8-hour weekday toll-free support. **PRO/CON:** Outstanding price, modern good looks, easy thumbwheel contrast/brightness adjuster; no on-screen display for fairly limited set of advanced controls.	626
9	Smile CB-6536SL 800/876-4532 www.smilekfc.com	NEW	$298	78	good/ good	**FEATURES:** 13.6-inch viewable area, .25mm CromaClear tube, up to 90-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 9-hour weekday toll-free support. **PRO/CON:** Good price, clearly marked controls, ample menus; controls have no gauges to show adjustment level, relatively small viewable area.	627
10	ADI MicroScan 4P 800/977-3336 www.adiusa.com	NEW	$339	78	good/ good	**FEATURES:** 13.8-inch viewable area, .28mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] 3.5-year warranty, 9-hour toll-free tech support. **PRO/CON:** Attractively sculpted front panel, controls among the best we've seen—easy, extensive, finely calibrated, intuitive; least-impressive graphics of any Top 10 monitor.	628

Best Buy For expanded reviews, visit www.pcworld.com/t10monitors. All products: 903

[1] Highest refresh rate at 800 by 600 resolution. [2] Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play.

HOW WE TEST Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), features and ease of use (25 percent), price (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



THIS MONTH our "most improved" award goes to Mitsubishi's Diamond Scan 15VX. With a new screen coating and other advances, it jumped from tenth to second place. Our more exacting tests also agreed with Panasonic's top-ranked PanaSync Pro P15. Former Best Buys from Dell and Nokia, hurt by high prices and lower scores on the new tests, dropped a bit. And some August contenders fell short, displaced by affordable newcomers. ■

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TOP 10 GRAPHICS BOARDS

	GRAPHICS BOARDS	Month tested	Street price (6/2/97)	Overall rating	PC WorldBench graphics score	3D score	Multimedia score	Comments	Reader service number
1	ATI 3D Pro Turbo PC2TV 905/882-2600 www.atitech.ca	retested this month	$219	98	189 very good	good	outstanding	**FEATURES:** 8MB of SGRAM, 220-MHz RAMDAC, ATI Rage II chip, bundled 3D modeling, image editing, and VRML software. **PRO/CON:** Terrific multimedia performance, nice 3D, connects to TV; expensive, mediocre video playback, no toll-free support.	601
2	Diamond Stealth 3D 3000 800/468-5846 www.diamondmm.com	retested this month	$170	96	191 outstanding	adequate	very good	**FEATURES:** 4MB of VRAM, 220-MHz RAMDAC, S3 Virge/VX chip, bundled 3D game, 3D design software, and multimedia encyclopedia. **PRO/CON:** Fast in 2D, great in two of three 3D games; driver bug in one game, no toll-free support.	602
3	ATI 3D Xpression+ PC2TV 905/882-2600 www.atitech.com	retested this month	$129	95	190 outstanding	adequate	adequate	**FEATURES:** 4MB of SGRAM, 170-MHz RAMDAC, ATI Rage II chip, bundled 3D games, 3D modeling, image editing, and VRML software. **PRO/CON:** Good in 2D and 3D, nice bargain, connects to TV; mediocre video playback, no toll-free support.	603
4	STB Nitro 3D 888/234-8750 www.stb.com	retested this month	$149	94	190 outstanding	adequate	adequate	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/GX chip, bundled 3D games. **PRO/CON:** Affordable, fast 2D, toll-free support, lifetime warranty, excellent AVI video playback; below-average 3D game play overall, driver bug in one game.	604
5	Diamond Stealth 3D 2000 Pro 800/468-5846 www.diamondmm.com	retested this month	$135	94	191 outstanding	adequate	very good	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/DX chip, bundled 3D game, photo-editing software, and multimedia encyclopedia. **PRO/CON:** Great 2D performance, inexpensive, connects to TV; no toll-free support, driver bug in one game.	605
6	Hercules Terminator 3D/DX 800/532-0600 www.hercules.com	retested this month	$149	92	189 very good	adequate	very good	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/DX chip, bundled 3D games. **PRO/CON:** Good price, quick in multimedia programs, excellent AVI video playback, toll-free support; subpar 3D quality overall, driver bug in one game.	606
7	STB Velocity 3D 888/234-8750 www.stb.com	retested this month	$199	91	189 very good	poor	adequate	**FEATURES:** 4MB of EDO VRAM, 220-MHz RAMDAC, S3 Virge/VX chip, upgradable to 8MB. **PRO/CON:** Good for graphics professionals, toll-free support, lifetime warranty; poor for 3D games overall, driver bug in one game, choppy video playback.	607
8	Matrox Mystique 220 800/361-1408 www.matrox.com/mga	retested this month	$179	89	190 outstanding	adequate	good	**FEATURES:** 4MB of SGRAM, 220-MHz RAMDAC, Matrox MGA-1164SG chip, bundled 3D games and VRML software, upgradable to 8MB. **PRO/CON:** Fast all around, easy to install and use; Direct3D games look bad, no toll-free or weekend support.	608
9	Hercules Stingray 128/3D 800/532-0600 www.hercules.com	retested this month	$249	88	184 very good	very good	poor	**FEATURES:** 4MB of EDO DRAM, 180-MHz RAMDAC, Alliance ProMotion-AT3D chip, 3Dfx Voodoo Rush 3D chip set, bundled games. **PRO/CON:** Terrific 3D quality, toll-free technical support; pricey, lackadaisical 2D performance.	609
10	Number NineFX Reality 772 800/438-6463 www.nine.com	retested this month	$279	87	190 outstanding	poor	very good	**FEATURES:** 4MB of VRAM, 220-MHz RAMDAC, S3 Virge/VX chip. **PRO/CON:** Fast in 2D and multimedia programs, excellent AVI video playback; pricey, poor in 3D games overall, driver bug in one game, no toll-free or weekend support.	610

Best Buy For expanded reviews, visit www.pcworld.com/t10graphics. All products: 901

HOW WE TEST We tested PCI boards under Windows 95 with PC WorldBench 1.0 at 800 by 600 and 16.8 million colors, at 1024 by 768 and 65,536 colors (reported here), and at 1280 by 1024 and 65,536 colors. The 3D score is based on frame rates in our VRML and 3D game tests, plus subjective ratings in three games: Microsoft's Monster Truck Madness, Eidos Interactive's Terricide, and Fox Interactive's Independence Day. The multimedia score is based on frame rates in our Macromedia Director and AVI playback tests, plus timed scores in our PowerPoint multimedia presentation tests. Boards were tested in a Dell Dimension XPS P133c with 32MB of EDO DRAM and 256K of pipeline-burst secondary cache. The overall rating is based on performance (40 percent), features (30 percent), price (20 percent), and support policies (10 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

NEW 3D AND MULTIMEDIA tests shuffled the order of the chart this month, with ATI's 3D Pro Turbo PC2TV claiming top spot. This $219 board is a little pricey, but it has the best balance of 2D, 3D, and multimedia performance we found. The number two $170 Diamond Stealth 3D 3000 is another sturdy all-around board, though it had a bug in one game. For details, see "2D and 3D Graphics Boards: You Can't Always Get What You Want." ■

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One-touch On-Screen Display *with digital controls.*

Used to be, there were two ways to get the sharper picture, richer colors and enhanced clarity of Aperture Grille technology. You could buy a high-end professional monitor from a company like NEC, Sony or Mitsubishi, with all the high-end features and a price to match. Or you could spend a lot less. And end up with a stripped-down imitation. Fortunately, that was then.

Now, of course, there's TeleVideo, the company that's been pioneering high-end technology for ordinary folks and quietly selling high-performance monitors at very reasonable prices since 1975. We've got a complete line of large-screen Aperture Grille monitors, including the flagship SVP260 pictured above. All with features comparable to (or even superior to) the Big Names, but at prices you can live with.

So how do we do it? Call **1-800-835-3228** to find out. Or visit us at **www.televideoinc.com**. But for now, let's just say that when you've been in the monitor business since bell-bottoms were cool, you learn a few things.

TeleVideo: good monitors, reasonable prices. (See for yourself.)

	Model	Aperture Grille (mm)	Refresh Rate (Hz) @1600x1200	H-Scan (KHZ)	MSRP ($)
17"*	**TeleVideo SVP260**	**0.25**	**66**	**24-82**	**779**
	Mitsubishi 87TXM	0.25	66	30-86	829
	Sony 17sell	0.25	60	30-85	899
	ViewSonic PT770	0.25	66	24-82	799
17"*	**TeleVideo SVP270**	**0.25**	**75**	**30-95**	**889**
	Eizo-Nano TX-C7S	0.25	73	30-92	1125
	Nokia 447Xi	0.25	n/a	31-92	899
	Sony 17sell	0.25	60	30-85	899
21"*	**TeleVideo SVP350**	**0.28**	**85**	**30-107**	**1649**
	Mitsubishi 91TXM	0.28	75	30-95	1649
	NEC P1150	0.28	75	31-94	1599
	IIYAMA Pro 21	0.30	75	30-94	1699

***Diagonal viewable area may vary.**

TeleVideo®

Over 20 Years of Display Technology

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Circle 222 on reader service card

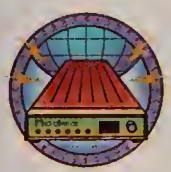
PC WORLD

TOP 10 MODEMS

	33.6-KBPS EXTERNAL MODEMS	Month tested	Street price (7/15/97)	Overall rating	Average transfer times per MB (min:sec)	Comments	Reader service number
1	3Com/U.S. Robotics Courier V.Everything 33.6 800/342-5877 www.3com.com	Jan 97	$225	80	2:42	**FEATURES:** FlashROM, distinctive ring, 230.4-kbps PC-to-modem speed, QuickLink II fax/data software, password protection, call-back security. **PRO/CON:** Above-average performer, loaded with features, manual volume control, great documentation; expensive, takes up a lot of room.	637
2	Diamond Multimedia SupraSonic 336 V+ 800/727-8772 www.diamondmm.com	Aug 97	$199	80	2:44	**FEATURES:** FlashROM, distinctive ring, 115.2-kbps PC-to-modem speed, Caller ID, voice-enabled, serial cable, headphones, microphone, COMit voice/fax/data software. **PRO/CON:** Loaded with features, technical support available on Saturdays, SupraFax voiceless sibling also a good buy; expensive.	638
3	Zoom Fax/Modem V.34X Plus 800/631-3116 www.zoomtel.com	Aug 97	$99	79	2:52	**FEATURES:** MNP-10EC error control, 115.2-kbps PC-to-modem speed, serial cable, distinctive ring, DOS/WinFax Lite fax/data software. **PRO/CON:** Least expensive modem on chart after fourth-place NewCom, easy-to-follow documentation, seven-year warranty; slow, no security features.	639
4	NewCom 33600efx 800/563-9266 www.newcominc.com	Mar 97	$85	79	2:48	**FEATURES:** V.FC, MNP-10 error control, 115.2-kbps PC-to-modem speed, QuickLink II fax/data software. **PRO/CON:** Lowest-price modem on chart, toll-free technical support; below-average performance, has only the basics for features, documentation could use a lot of improvement.	640
5	Logicode Quicktel II-E With LED Array 800/735-6442 www.logicode.com	NEW	$130	79	2:52	**FEATURES:** Novel curved design, voice mail, 115.2-kbps PC-to-modem speed, speakerphone, DSVD, built-in microphone, QuickLink II Message Center software, Intel ProShare software. **PRO/CON:** Inexpensive for a full-featured modem, easy-to-follow documentation; slow, supplied book on the Net is outdated and too technical.	641
6	Microcom OfficePorte Voice 33.6 800/822-8224 www.microcom.com	May 97	$130	78	2:44	**FEATURES:** MNP-10EC error control, 115.2-kbps PC-to-modem speed, voice mail, distinctive ring, Focal Point fax/data software. **PRO/CON:** Good price on voice mail-equipped modem with built-in microphone, analog simultaneous voice/data; not upgradable, heavy-handed technical documentation.	642
7	Practical Peripherals 33.6 MiniTower Internet Kit 800/377-4377 www.practical.com	May 97	$119	78	2:40	**FEATURES:** QuickLink II fax/data software, 115.2-kbps PC-to-modem speed, McAfee VirusScan, and Quarterdeck WebTalk. **PRO/CON:** Great price, fantastic support policies (including lifetime warranty and weekend technical support); lacks security and upgrade features, documentation is too technical.	643
	56-KBPS EXTERNAL MODEMS						
1	3Com/U.S. Robotics Sportster 56K Faxmodem External Model 1786 800/342-5877 www.3com.com	NEW	$219	79	2:44/2:56 [1]	**FEATURES:** Uses x2 protocol, 115.2-kbps PC-to-modem speed, manual volume control, RapidComm fax/data software. **PRO/CON:** Very good documentation, company guarantees free upgrade to the final 56K standard even if that means swapping the modem, big software bundle; a little pricey.	644
2	Diamond Multimedia SupraExpress 56e 800/727-8772 www.diamondmm.com	NEW	$170	77	2:39/3:05 [1]	**FEATURES:** Uses K56flex protocol, V.FC, 115.2-kbps PC-to-modem speed, V.80 videoconferencing protocol, serial cable, FaxTalk fax/data software. **PRO/CON:** Very small and light, reasonably priced; limited number of status lights, no external power switch, serial cable is not detachable, no on/off switch.	645
3	Motorola ISG ModemSurfr 56K Desktop Data/Fax Modem Model 3456 800/566-3266 www.mot.com/modems	NEW	$179	76	2:34/3:08 [1]	**FEATURES:** Uses K56flex protocol, 115.2-kbps PC-to-modem speed, V.80 videoconferencing protocol, distinctive ring, Caller ID, Trio Communications Suite 5.1 fax/data software. **PRO/CON:** Company guarantees free upgrade to the final 56K standard even if that means swapping the modem; documentation only on CD-ROM.	646

Best Buy For expanded reviews, visit www.pcworld.com/t10modems. [1]V.34 TAS transfers/56-kbps ISP downloads; see "How We Test." All products: 904

HOW WE TEST We test 33.6-kbps modem-to-modem performance using a pair of identical modems on a Telecomm Analysis Systems (TAS) simulated phone network. It sends a text file over 55 line conditions, and a mix of five files—graphics, text, program, and compressed files—over one line condition. For our 56-kbps tests, we call a local Internet service provider access number and transfer .jpg, .doc, and .zip files continuously over an 18-hour period. The times to transfer a megabyte of data are higher in the ISP test than in the TAS test because the files used in the former are different and less compressible. Results for the two tests are not comparable. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.



NEW TECHNOLOGY does not always require big bucks. All three 56-kbps modems on our chart have moderate prices and good speed. The 3Com/U.S. Robotics Sportster 56K was the fastest at downloading files from our Internet service provider and is nicely designed. Sticking to 33.6? You can find great values: Four of the seven here cost $130 or less. It's not cheap, but 3Com/USR's Courier V.Everything 33.6 is quick and has extensive features. ■

We've contributed several advances to the notebook PC.

MMX™
intel inside
pentium®
PROCESSOR

Greater availability because NEC is one of the world's largest manufacturers of TFT LCD displays.

12.1" SVGA active matrix TFT display with 64K colors at 800 x 600 resolution for a brighter, richer, photorealistic display.

Intel® 166MHz Pentium® processor with MMX™ technology.

VersaBay modular component technology for maximum flexibility and instant customization.

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BUILT TO ORDER

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NEC also introduced the first color laptop. The first notebook with an active matrix display and modular components. And one of the first portables with MMX™ technology. What's more, we offer the most extensive selection of notebooks available.

Introducing NEC NOW. An entirely new approach to buying computers.

Our approach to direct sales is no less innovative.

Like inventing it.

NEC NOW℠ connects you with System Consultants who have the expertise to match the right notebook to your unique situation. And NEC NOW is backed by the resources, quality and dependability of one of the world's largest computer companies. We even give you the choice of working through a qualified NEC reseller partner.

So when you need a notebook PC, call the company that invented it. And reinvented direct sales.

Why NEC NOW?

- The security of partnering with a company known for its technological innovations.
- The flexibility of ordering direct or through a reseller.
- The expertise of System Consultants.
- The immediate availability of competitively priced products.
- The resources of one of the world's largest computer companies.

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MMX™ intel inside pentium® PROCESSOR

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NEC Versa® 6060 Series *High performance desktop replacements.*

Common Features: PCI Bus with 128-bit Graphics Accelerator • 32-bit CardBus Support • 2MB VRAM • Integrated 16-bit Stereo Sound • USB Port • VersaBay™ II Option Slot Accepts CD-ROM, Floppy Drive (both included), Optional 2nd Hard Drive and 2nd Battery • Lithium Ion Battery • DMI 2.0 Compliant • Intel® LANDesk® Manager 3.0 • Upgradeable 3-Year Limited Warranty

Versa 6060

- 166MHz Pentium® processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 48MB EDO DRAM (80MB max)
- 2.1GB Hard Drive/20X max CD-ROM
- U.S. Robotics® x2™ XJACK® 56Kbps* Fax Modem
- Microsoft® Windows NT® 4.0 with Free Telephone Support
- * Optional Versa Docking Station 6000 Plus, add $899
- * Upgrade to a 3.2GB Hard Drive, add $299

$4099
Business Lease: $144/mo.

Versa 6060

- 166MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 32MB EDO DRAM (80MB max)
- 2.1GB Hard Drive/20X max CD-ROM
- U.S. Robotics x2 XJACK 56Kbps* Fax Modem
- MS® Windows® 95
- * Optional Versa MiniDock™ 6000, add $499
- * Optional 2nd Lithium Ion Battery add, $199
- * Optional VersaPro™ Ballistic Nylon Carrying Case, add $99

$3849
Business Lease: $135/mo.

Versa 6060

- 166MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB EDO DRAM (80MB max)
- 2.1GB Hard Drive/20X max CD-ROM
- MS Windows 95
- * Upgrade to 32MB RAM, add $159
- * Optional 2nd Lithium Ion Battery, add $199
- * Optional NEC Xircom 10Base-T Network Card, add $139
- * Optional Versa PortBar™ 6000 Port Replicator, add $199

$3499
Business Lease: $126/mo.

NEC Versa 2700 Series *All-in-one convenience at a sensible price.*

Common Features: PCI Bus with 128-bit Graphics Accelerator • 256KB L2 Pipeline Burst Cache • 32-bit CardBus Support • 2MB VRAM • USB Port • 56Kbps* Integrated Modem • Stereo Speakers and Subwoofer with 3D Stereo Sound • DMI 2.0 Compliant • Intel LANDesk Manager 3.0 • MS Windows 95 • Bundled MS Software Including MS Word 97 • Upgradeable 1-Year Limited Warranty

Versa 2760MT

- 166MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB EDO DRAM (96MB max)
- Built-in 2.1GB Hard Drive, 16X max CD-ROM, 1.44MB Floppy Drive, and Lithium Ion Battery
- * Upgrade to 80MB RAM, add $699
- * Optional 2nd Lithium Ion Battery, add $199
- * Optional Versa PortBar 2700 Port Replicator, add $159
- * Optional NEC Xircom 10Base-T Network Card, add $139

$3199
Business Lease: $115/mo.

Versa 2730MT

- 133MHz Pentium processor with MMX technology
- 12.1" SVGA Active Matrix TFT Color Display
- 16MB EDO DRAM (96MB max)
- Built-in 1.44GB Hard Drive, 16X max CD-ROM, 1.44MB Floppy Drive, and NiMH Battery
- * Upgrade to 48MB RAM, add $299
- * Optional Lithium Ion Battery, add $199
- * Optional VersaPro Ballistic Nylon Carrying Case, add $99
- * Upgrade to a 2.1GB Hard Drive, add $149

$2799
Business Lease: $101/mo.

Versa 2730M

- 133MHz Pentium processor with MMX technology
- 12.1" SVGA DSTN Color Display
- 16MB EDO DRAM (96MB max)
- Built-in 1.44GB Hard Drive, 16X max CD-ROM, 1.44MB Floppy Drive, and NiMH Battery
- * Upgrade to 32MB RAM, add $159
- * Optional Lithium Ion Battery, add $199
- * Optional VersaNote™ Ballistic Nylon Carrying Case, add $69
- * Upgrade to a 2.1GB Hard Drive, add $149

$2349
Business Lease: $85/mo.

NEC Direction™ PCs *A new direction in cutting edge technology.*

Common Features: Mini-Tower or Desktop Tool-Less Chassis • 24X max CD-ROM • 3.5" Floppy Drive • MS Windows 95 • MS Office 97 SBE • 2 USB Ports • Microphone • Palmrest Keyboard and MS IntelliMouse® • 3-Year Limited Warranty with 1-Year On-Site Service • *DirecPC Satellite Dishes are Now Available as Upgrades on all Direction Systems*

Direction SPT233

- 233MHz Pentium processor with MMX technology/ 512KB L2 Pipeline Burst Cache
- 6.4GB Ultra DMA Hard Drive, 9.5ms/64MB SDRAM
- Number Nine PCI Revolution 3D, 8MB WRAM
- Altec® ACS-45 Speakers/AWE32 Wavetable Audio
- Iomega® Zip Drive
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C700™ 17" Monitor (16" v.i.s.)
- * Upgrade to 128MB SDRAM, add $379
- * Upgrade to Altec ACS-410 Speakers with ACS-251 Subwoofer, add $69

$2889
Business Lease: $104/mo.

Direction SPT233

- 233MHz Pentium processor with MMX technology/ 512KB L2 Pipeline Burst Cache
- 7.0GB Ultra DMA Hard Drive/32MB SDRAM
- Number Nine PCI Revolution 3D, 4MB WRAM
- Altec ACS-45 Speakers/AWE32 Wavetable Audio
- Iomega Zip Drive
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to NEC MultiSync® A700™ 17" (15.6" v.i.s.) Monitor, add $229
- * Upgrade to 64MB SDRAM, add $199

$2649
Business Lease: $95/mo.

Direction SPT233

- 233MHz Pentium processor with MMX technology/ 512KB L2 Pipeline Burst Cache
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- Number Nine PCI Revolution 3D, 4MB WRAM
- Altec ACS-45 Speakers/AWE32 Wavetable Audio
- NEC C700 17" Monitor (16" v.i.s.)
- * Upgrade to Altec ACS-410 Speakers with ACS-251 Subwoofer, add $69
- * Optional U.S. Robotics 56Kbps* Data/Fax/Voice Modem, add $119

$2379
Business Lease: $86/mo.

Direction SPL300

- 300MHz Pentium II processor with MMX technology/ 512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 9.0GB SCSI Hard Drive/64MB SDRAM
- Number Nine AGP Revolution 3D, 4MB WRAM
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- Adaptec 2940UW SCSI Controller
- Iomega Zip Drive
- NEC C700 17" Monitor (16" v.i.s.)
- MS Windows NT 4.0
- * Upgrade to 128MB SDRAM, add $359
- * Upgrade Video Memory to 8MB WRAM, add $119

$4229
Business Lease: $148/mo.

Direction SPL266

- 266MHz Pentium II processor with MMX technology/ 512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- NEC C550 15" Monitor (14" v.i.s.)
- * Upgrade to Wavetable Audio, add $49
- * Upgrade to NEC C700 17" Monitor (16" v.i.s.), add $199

$2329
Business Lease: $84/mo.

Direction SPL233

- 233MHz Pentium II processor with MMX technology/ 512KB Integrated L2 Cache
- ATX Motherboard with 440LX Chip Set
- 4.3GB Ultra DMA Hard Drive/32MB SDRAM
- 4MB SGRAM AGP Graphics Card
- Altec ACS-90 Speakers/Integrated Yamaha Sound
- U.S. Robotics 56Kbps* Data/Fax/Voice Modem
- NEC C550 15" Monitor (14" v.i.s.)
- * Upgrade to 7.0GB Hard Drive, add $109
- * Upgrade to Number Nine AGP Revolution 3D, 4MB WRAM, add $219

$2199
Business Lease: $79/mo.

To order, get a free catalog or find your nearest reseller call: Mon-Fri 8am-8pm EST

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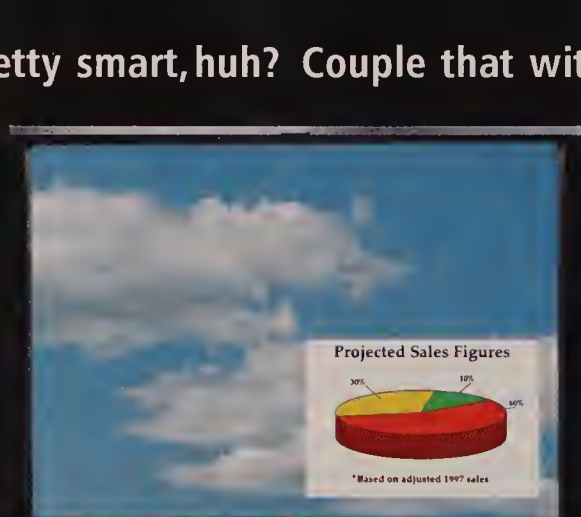
NEC

[ANNOUNCING THE POLAVIEW 315 MULTIMEDIA PROJECTOR.]

HOW YOU KEPT YOUR AUDIENCE ON THE EDGE OF THEIR COLD, GRAY METAL CHAIRS BEFORE IS BEYOND US.

Some people are natural presenters. The other 98% of us, well, we rely on cool features. Our new Polaview 315 multimedia projector not only has picture-in-picture so you can run both video and data at once, PC card it also supports a pc card that allows you to play back your presentation without lugging along your computer. Pretty smart, huh? Couple that with other features like power-zoom, power keystone correction, and the



brightest 24-bit color, 600 ANSI lumens XGA 1024x768 PIXELS and you've got yourself a world-class electronic conference room indeed. To learn more about our complete line of Polaview multimedia projectors or to receive a free CD-ROM demonstration, call 800-816-2611, ext. 045.

Polaroid

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ON THE CUTTING EDGE OF PRESENTATION TECHNOLOGY

GET MOBILIZED WITH TODAY'S ADVANCED, MOBILE LCD PROJECTORS.

Over the past decade, the ever-growing power and sophistication of PCs and software have pushed presentation output capabilities into the stratosphere. So much so that today it doesn't take a graphics superstar to create a stunning, attention-grabbing presentation—or even a full-blown multimedia extravaganza. Which means that all walks of professionals—from educators to corporate training, sales, and finance experts—now have on their desktops all the power it takes.

But what's the best way to take the masterpiece that resides on your hard drive and project it with high-impact persuasiveness for

all the world to see? That's not an easy question. But if you first can determine exactly what your needs are and how much you're willing to spend, it's a question that can yield many good answers.

First, narrow your options. Multimedia presentations? The terminology covers a lot of turf—from training modules on corporate intranets, capabilities presentations on the Web, and desktop videoconferencing, to the more familiar variety involving face-to-face interaction.

Epson's PowerLite 5000 provides excellent color saturation and contrast for captivating presentations.

It is this last variety, and the tools that can help you succeed, that are the focus of this overview.

LCD projectors lead the way in mobile presentation technology. LCD projectors are all-in-one units that use their own internal light source to project up to room-size images from computers. Some models accept video signals and offer stereo sound. LCD projectors are quite easy to use. It's basically a question of connecting your laptop to the projector, familiarizing yourself with the functions, turning it on, and you're off and running.

Because they concentrate their light output through a single lens, LCD projectors are about twice

WHAT'S BEHIND THE EXPLOSIVE GROWTH IN MULTIMEDIA PROJECTION?

In the peripherals marketplace, multimedia projection is one of the fastest-growing sectors. Since the introduction of the first LCD display panel in 1987, sales worldwide for LCD panels and projectors have gone from zero to nearly $2 billion. That's not to mention related products such as the software used to generate presentations.

The benefits propelling this growth are well documented. First and foremost is the presentation itself: When vivid color, riveting video, dazzling effects, and stereo sound team up, the effects on the audience are unmistakable. Multimedia presentations are simply more memorable and more effective. And not only that: Since today's presentation technology often works in well-lighted rooms and is more versatile, predictable, and easy to use than many of the old, "traditional" techniques (such as overheads and slides), the presenter is able to do a better job concentrating on the audience and the message—instead of the equipment. Bottom-line boosting competitive advantages like these have business professionals of all stripes flocking to multimedia projection.

And fortunately, the market is responding with products that are increasingly powerful, portable, and affordable.

Among other pluses, Sanyo's new PLC-5500NA features power zoom and focus and stereo speakers.

ViewSonic® makes your bright ideas brilliant.

Remote control included

The PJ800 projects a sharp, crisp image even in well-lit rooms.

The new Macintosh® and PC compatible PJ800 is a 3-panel (1.3" each) LCD Projector that provides rich screen colors and eliminates the "wash out" typical on most 1-panel LCD projectors. Its eye-opening 800 x 600 true resolution brightens any presentation. And with Advanced Video Compression, you can get 1,024 x 768 resolution while the images stay as sharp as if they were not compressed. With a 200:1 contrast ratio, you can project anywhere from 30" to 300" diagonal with confidence. It comes complete with a remote control and a 260 Watt DC metal halide lamp that lasts up to five years with normal use. What a brilliant solution to your A/V needs.

PJ800
550 ANSI Lumens
3-panel 1.3" Active LCD
3,000 hour, 260W DC Metal Halide Lamp
800 x 600 (SVGA) or 1,024 x 768 w/Advanced Video Compression
Macintosh® & PC Compatible

Brilliant. But then, that's why ViewSonic is "The Display Technology™ Company."

ViewSonic backs the new PJ800 with the brilliance and value that have helped us explore and conquer new fields of visual excitement. In addition, the PJ800 is backed by our limited 3-year warranty on parts & labor.*

For more information call ViewSonic at (800) 888-8583 and ask for agent 7867, or visit our website at: www.viewsonic.com.

(909) 869-7976 Fax: (909) 869-7958 • Internet: www.viewsonic.com • Specifications subject to change without notice
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ViewSonic®

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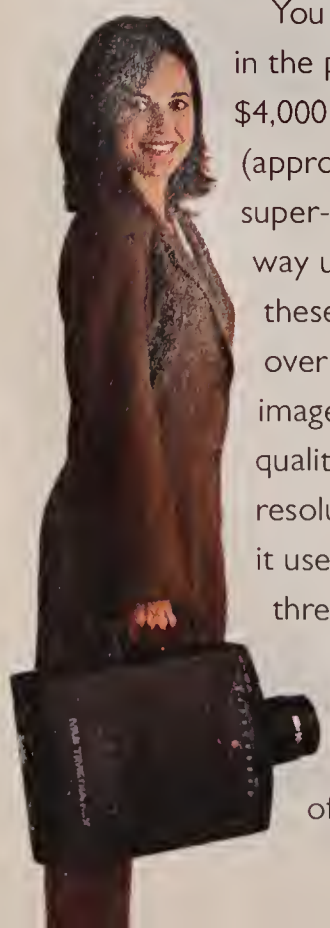
as bright as an LCD projection panel and overhead projector combination. Additionally, since no overhead is required, LCD projectors are much more portable and less intrusive at the presentation site than a panel and overhead duo. Of course, these benefits come at a cost: while LCD projection panels top out at around $2,500, LCD projectors range from about $4,000 up to $13,000 and more for high-resolution units with stereo speakers and multiple computer and video inputs. At the very top of the line, full multimedia projectors generally offer zoom lenses, top-notch video and stereo output, sophisticated resizing technologies, and metal halide lamps for super-sharp projection. Most of the better machines support international video standards such as NTSC, PAL, and SECAM.

In oddition to 600 ANSI lumens and XGA resolution, Poloroid's Poloview 315 hos odvonced feotures such os power-imoge zoom ond power-focus.

Things to consider before buying.

The range of features that differentiates LCD projectors is quite large. And with nearly 40 manufacturers serving up more than 150 models (frequently under a number of different private labels), it can be confusing and time-consuming to sort them out.



You should know that there are three camps in the projector arena: entry-level (in the $4,000 to $7,000 range); high-performance (approximately $8,000 to $13,000); and the super-high performers that can run all the way up to $55,000 or more. What's driving these vastly differing prices? It's quite an over simplification, but the short answer is image quality. A longer answer is that image quality is a function of the projector's native resolution mode, the number of devices it uses to project an image (one panel vs. three), and the technology it uses to resize images coming from a laptop having a different resolution. All those things, of course, add up. So at the front end of the selection process you have to ask yourself to what degree image quality matters. Because the better the image, the more you'll pay.

Let's run through a list of other considerations that can help you narrow your list:

Portability—Are you looking for a road warrior, or a system to use within the corporate campus? If you're often on the road, traveling by airplane, you'll want to consider a small, lightweight projector. Epson, ViewSonic, and Sanyo offer excellent traveling companions. For ultimate portability, the brand-new Polaview 315 from Polaroid provides built-in PC card playback mode, so you can even leave your laptop back in the office.

The majority of projectors are in the 15-pound range, with 20-24 pounds filling in the top end. As a rule, heavier projectors tend to provide better image quality. So, if the projector is likely to spend a lot of time in a fixed installation—a conference room, for instance—a heavier projector is not a bad idea (the Mitsubishi LVP-X100 is a top performer in the above-20-pound

Weighing in at 20 pounds, Mitsubishi's LVP-X100 provides high-resolution XGA output with 600 ANSI lumens of brightness.

(Brother can you paradigm?)

1000 LUMEN VGA/S-VIDEO FOR ONLY $5495! 800 LUMEN SVGA/S-VIDEO FOR ONLY $6995! *

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What is the WallZapper™?

The Prolux WallZapper™ zaps a sharp, 1000 ANSI lumens (yes, a full 1000!) with a 16.7 million displayable color palette, 150:1 contrast ratio, full support for NTSC, PAL, SECAM, stereo audio input for each source, and user replaceable super long-life metal-halide bulb for only $5495!

2000 lumen WallZapper™Stacker

For stadiums, auditoriums, schools and churches, the WallZapper™Stacker gives twice the brightness at the lowest cost-per-lumen in the industry. Brilliance was never as inexpensive or easy as this!

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WallZapper™1000 is the brainchild of Prolux's Steve Wilson who invented much that's new in the world of illumination. He revolutionized stage/film lighting with a 'cool' lamp (equally bright at half the energy!). His cinema-projection illumination designs are now used in nearly all the world's movie theaters. His flash design is in most new US-made disposable cameras for twice the light allowing faster shutter speeds. *And all these products now lead in their fields!*

None better for entertainment

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Where to get WallZapper™

So call 1-800-3PROLUX for the location of your nearest Prolux dealer for a demo and to fill all your presentation and entertainment needs, including peripherals, screens, installations, accessories and information. Also, be sure to clip and save this ad for future reference — you'll be very glad that you did.

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Prolux™ WallZapper1000™

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Princeton Graphics Pro-375 provides high-quality images that can be viewed with or without a screen—even under ambient light conditions.

category). If your projector is going to be a truly permanent installation, you may want to consider one that can be mounted on the ceiling.

Presentation Setting—The size and characteristics of the setting in which your presentations typically take place will influence the image quality you require of a projector. Is it normally a large room? What is the size of the audience? Are the lights on or off? If the presentation is before a smaller group, many presenters prefer to enhance the intimacy of the setting by leaving the lights on; it's easier to do an "in-the-dark" presentation in front of 150 people than it is in front of a gathering of 20. So the size of your audience will determine your brightness needs. Also remember that larger screens require more lumen to fill them:

- 400+ ANSI lumens in a fully lighted room
- 150-400 ANSI lumens in a partially lighted room
- 150 ANSI lumens in a dark room.

In larger settings, you'll definitely want full-featured remote control capabilities. Most projectors offer remotes, but the extent of what they can do varies. If you're the type of presenter who likes to roam around the room, be sure to get one that provides remote mouse capabilities. And if you're often in particularly large rooms, you might also want a projector that can accommodate the supplemental audio support of external speakers.

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Polaroid's unique picture-in-picture feature lets users simultaneously run output in two different media—such this chart within a video clip.

Presentation Format—What is the content of your presentation and how was it generated? All projectors will run presentations generated by popular presentation software such as Corel Presentations. Highly specialized engineering and scientific imagery generated by workstations will look best on projectors with XGA resolution (1024 x 768), much higher than the VGA standard 640 x 480. Polaroid's Polaview 315, for instance, provides exceptional sharpness and clarity, making it ideal for projecting CAD/CAM, medical, and technical images.

Most laptops today support SVGA resolution (800 x 600), so a projector with that resolution is appropriate in most cases. Will the presentation incorporate sound and video from sources external to your laptop? Then you'll need separate video inputs for VCRs, laser disc players, and live video cameras.

And finally, be sure to determine in advance if the projector will be shared by multiple users. Most projectors have just one computer input, allowing only one notebook to be hooked up at a time. If you're likely to be giving "tag-team" presentations, you'll need a projector with multiple inputs, like the Epson PowerLite 5000 or the ProLux WallZapper 1000.

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LUMEN

THE HOLY GRAIL OF PROJECTION TECHNOLOGY

The most common benchmark for comparing projectors is brightness. And the most common brightness standard is the ANSI (American National Standard Institute) lumen, a measurement based on the average of light taken from nine sections of a projected image. Like most things in life, the more ANSI lumens you have, the better. Most projectors fall in the 300 to 600 range. There are some powerful exceptions, an affordable example being the ProLux WallZapper 1000V with a full 1000 lumen output. In the past, the relationship between brightness and weight was quite direct: the heavier the machine, the brighter. That, however, is changing. You can now find several relatively light portables with 400 or more ANSI lumens.

Brightness is a function of how efficiently the machine converts lamp wattage into a projected image. In this regard, three-panel systems seem to do a better job, and will generally throw more lumens than a single-panel unit with the same lamp.

When comparing projectors, be sure you're going apples to apples. In addition to ANSI lumens, some manufacturers will state brightness in terms of lux or lumens. Additionally, brightness is often reported as maximum, minimum, or typical. The bottom line is that you have to watch the terminology carefully to be sure you're making an accurate comparison. More often than not, the best way is with an old-fashioned eyeball test. Also keep in mind that the type of lamp has a strong impact on brightness. Halogen lamps throw a slightly yellow light, while metal halide lamps give a whiter cast.

With 1000 ANSI lumen output, the ProLux WallZapper 1000V is one of the brightest projectors available in any cost category.

To VGA or not VGA?

The question of resolution has generated a lot of confusion in the LCD marketplace. Since most presenters prefer to deliver presentations without having to switch drivers or change the resolution mode of their notebooks, the impulse is to get a projector with the same resolution as the computer that will drive the presentation. That's a good idea, especially if you want the projected image to look like what you see on the notebook screen. But the fact is that projectors of any resolution mode can accommodate computers having a different resolution. The question to ask is what technology do they use to do that. The entry-level machines will usually rely on "line dropping," a variety of compression that removes lines from the image in order to make it fit. In the process, the image can suffer quite a bit.

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A LITTLE BACKGROUND ON PROJECTION TECHNOLOGY

The terms get thrown around a lot. So what exactly do they mean?

Single-Panel LCD **LCD is a transmissive technology. Single-panel projects light through a single panel of glass, poly-silicon, or an active-matrix LCD containing red, green and blue pixels. Many entry-level projectors use this technology because it offers a clear focus at a lower cost.**

Three-Panel LCD **In this technology, light is projected through three LCD panels, each responsible for a different color—red, green and blue. Then, with prisms and mirrors, the image is focused to deliver the final projected image. Three-panel systems offer better images, with increased color saturation and contrast. They do, however, weigh and cost more than single-panel machines.**

DLP (Digital Light Processing) **DLP is a patented technology from Texas Instruments. DLP is not a transmissive technology like LCD. Rather, it is a reflective system that sends light through thousands of digital mirrors that reside on a microchip before projecting the final image.**

Epson's PowerLite 5000 has the versatility to simultaneously accommodate a variety of input sources, including two notebooks running on different platforms.

A growing number of manufacturers, however, are moving to more complex resizing technologies to allow their projectors to work optimally with a variety of native mode laptops. Epson, among others, offers a rather sophisticated recalculating algorithm with its top-line products. If you're planning on upgrading your notebook to a higher-resolution model, it would be good idea to look at projectors that handle a variety of resolution modes well.

There are three major resolution options currently in the projector market:

VGA (640 x 480)—This is the most common resolution for notebook computers that were shipped prior to 1996. Most entry-level projectors are VGA or SVGA.

SVGA (800 x 600)—This resolution is becoming the new standard for notebooks, primarily because it is the default setting on Windows 95. With SVGA, more information can fit on the notebook's screen—and thus provide a larger projected image.

XGA (1024 x 768)—The future of notebook computers lies in XGA

ViewSonic's PJ800 utilizes three LCD panels to project sharp, well-saturated color images.

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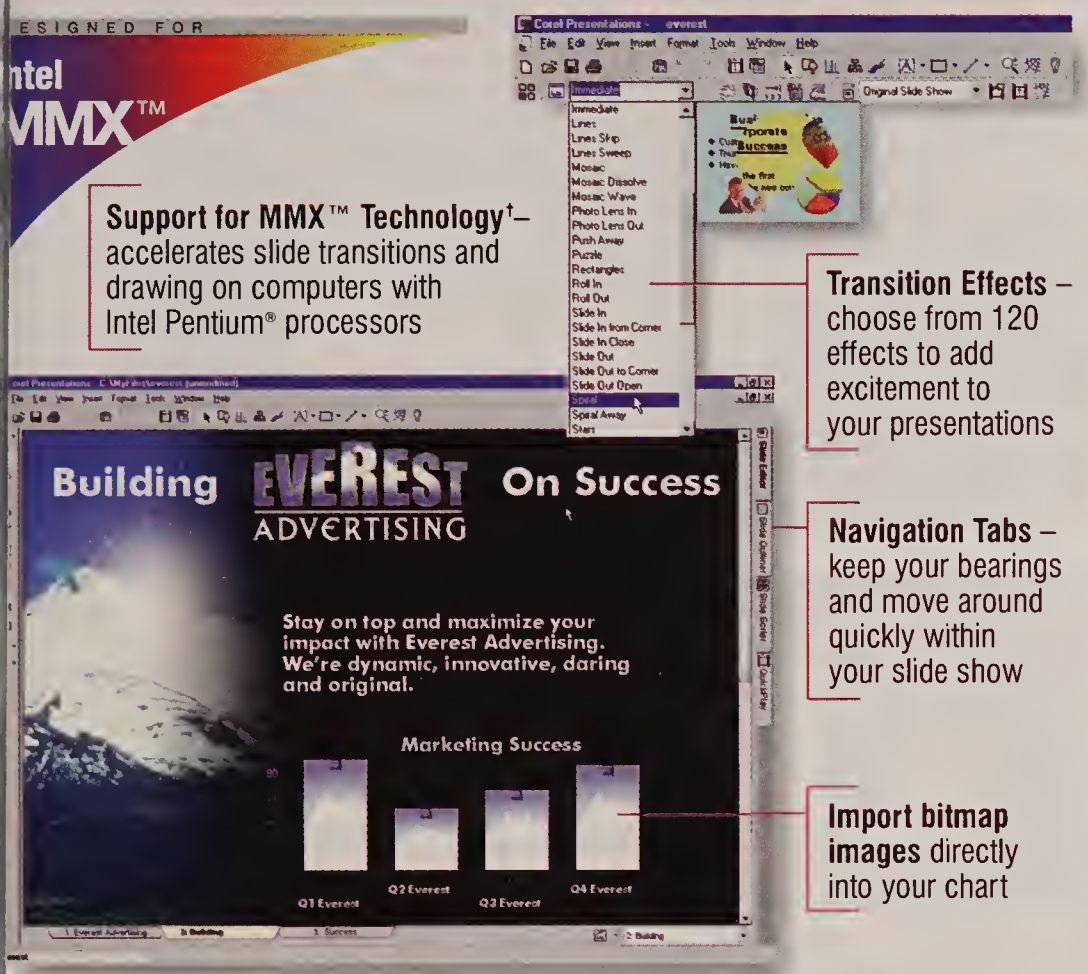

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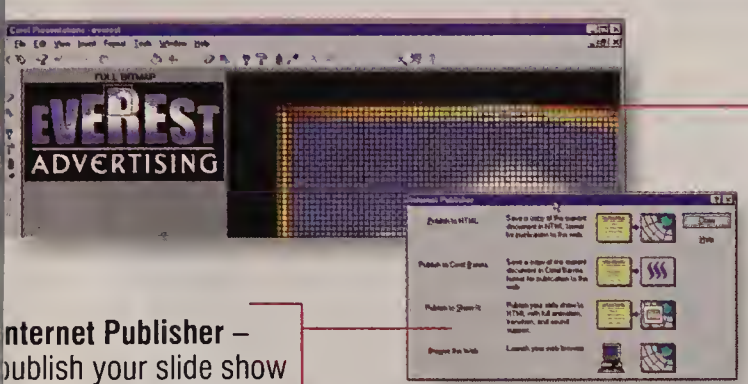

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Add multiple slides simultaneously	✔	no
Import outlines into org. charts	✔	no
Customizable background gallery	✔	no
Slide navigation tabs	✔	no
Chart styles	✔	no
Range Highlighter used in datasheet	✔	no
Sort pie slices	✔	no
Separate drawing mode	✔	no
QuickWarp™ objects	✔	no
Blend objects together	✔	no
Place/Resize/Rotate chart	✔	no (must separate into objects)
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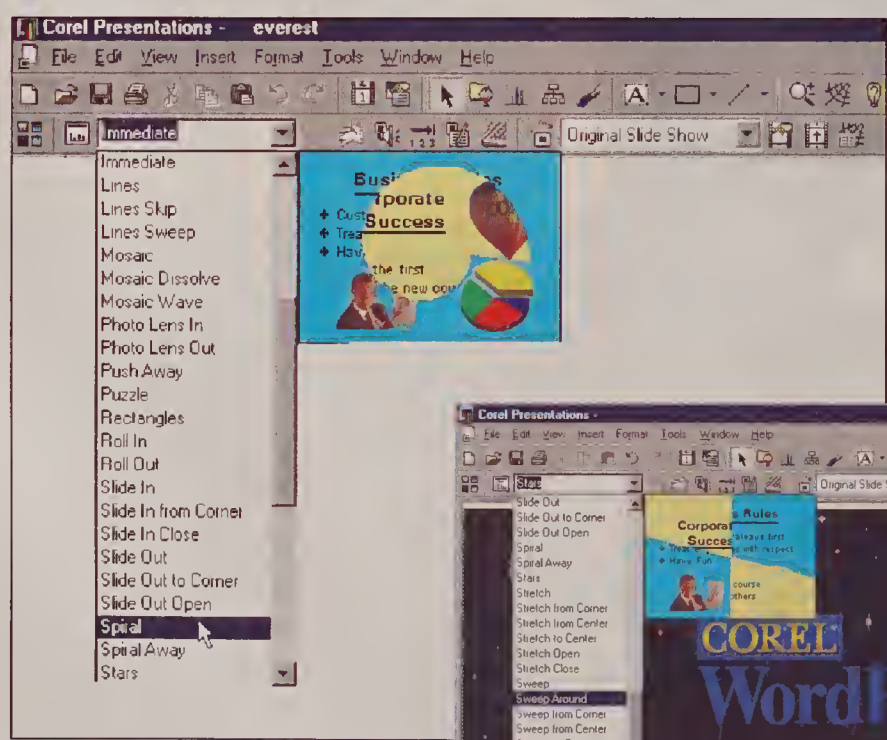
resolution. Because of this, many people feel compelled to buy projectors that will support the next generation of laptops. But keep in mind that SVGA projectors will work fine with XGA computers. So unless you have special, high-resolution needs—such as using CAD/CAM output from workstations—you may be better off with an SVGA projector. That's because the XGA models, for the moment, are heavier and more expensive.

Don't be content with mediocre content.

Multimedia presentations on PCs have come into their own in the past few years. That's because the software—once strictly in the realm of the computer-graphics pros and the Mac users—has become much more easy to use on Windows systems. So today, basic authoring is relatively simple (high-end multimedia authoring is still a complex endeavor requiring a good amount of ramp up).

There is a variety of programs that are affordable, easy to use and, in most cases, sufficiently robust to meet general business presentation purposes, including simple multimedia. Most of these entry-level packages allow users to incorporate basic effects, animation, and video (Apple QuickTime or Microsoft Video for Windows) into their text and chart presentations. Many also offer hypertext linkages, letting users alter the sequence of their presentations on the fly. Good standard presentation packages include Adobe Persuasion, Claris Impact, and Corel Presentations.

Higher-end multimedia will generally require software that carries with it a longer learning curve and a larger price tag. If you're up to the task, you'll get more powerful drawing and animation capabilities, as well as more sophisticated internal scripting and sequencing tools. These packages—including Alpha Software Bravo, Asymetrix Compel, and Q/Media—have the power to create fairly complex presentations without programming. For full-blown multimedia authoring—the kind



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MegaView Pro 37	37"/35.0" DVI*	1280 x 1024/75 Hz NI	H: 15-85 kHz	V: 40-120 Hz
MegaView Pro 42	42"/40.0" DVI*	1280 x 1024/60 Hz NI	H:15.75 & 20-64 kHz V: 45-120 Hz	

* DVI: Diagonal Viewable Image.

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you might find on a corporate intranet—you'll have to take a big leap up to a highly sophisticated tool like Macromedia Director.

MAKING SUCCESSFUL PRESENTATIONS

Great equipment is a big help, but making a successful presentation requires being prepared for the unexpected. Here are a few things to remember before you take the plunge into your next presentation:

- Test, and retest, all your equipment in advance of the presentation (off site and on site).
- Run through your rehearsals using the same equipment—and all of it—that will be on site at the real event.
- Don't forget Plan B: If your projector dies or your computer crashes, do you have a backup? Be prepared to go low-tech, and have the hand-outs and other materials you'll need ready to pull it off.

ViewSonic's PJ800 skillfully handles complex graphics.

This special supplement was made possible by the sponsors whose advertisements appear within its pages.

PRESENTATION RESOURCES

Okay. So you've seen the range of products, and now understand some of the differences. The list below, by no means exhaustive, can help you get more information. But the best way to really discover a solution right for you or your company is to head over to a reseller, discuss your needs and budget, kick the tires, and make a decision. It's time to get mobilized.

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The PLC-8800N has it all, and is just one in Sanyo's full line of projectors that make presentations more presentable. So on your next presentation, take no prisoners. For a dealer near you, call (888) 495-3452 x288.

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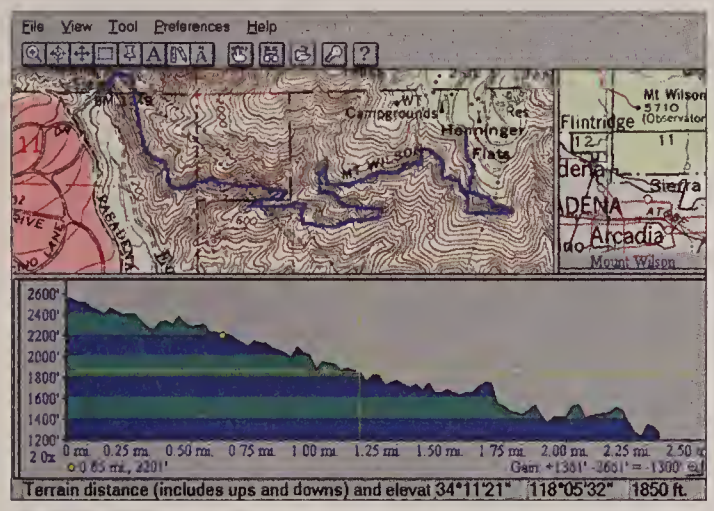

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BOOKSHELF UPDATE

HO HUM. As predictable as turkey on Thanksgiving, Microsoft has released a new and yet-again improved version of **Bookshelf,** its one-disc, multivolume reference work. The 1998 release includes the standard (though updated) reference works: a thesaurus, a dictionary, a book of quotations, a 1997 world almanac, a world atlas, The People's Chronology, a zip code directory, and an Internet directory (with hyperlinks). This year Microsoft has added a condensed version of Encarta, a computer/Internet dictionary, and a ▶

Scanning for the Masses

RECENTLY I BRUSHED the dust off dozens of pictures and scanned them into my computer using the **EasyPhoto SmartPage Pro.** This thing worked great! The quality was surprisingly good—the 30-bit color was correct and the image sharp. More surprising was how easy the scanner was to set up and use: It connects to a parallel port, and my printer attaches to the scanner. The scanner also detaches from the base, allowing me to scan books. After I scanned in the pictures (photos can be up to 8 by 10 inches), a bundled editing program let me modify them. I was able to remove scratches, change my red eyes to blue, and adjust the contrast and color. The SmartPage Pro includes Adobe PhotoDeluxe for more advanced editing, as well as optical character recognition and management software for scanned-in documents. —**Steve Bass**

EasyPhoto SmartPage Pro

GRADE: **A**; PRICE: $199 street; Storm Technology; 888/438-3279; www.easyphoto.com

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SCAN YOUR PHOTOS: The SmartPage Pro makes digitizing your photos easy.

PHOTOGRAPH: ROBERT CARDIN

EDITED BY Christina Wood

helpful parental control feature. But cheer up: Though Bookshelf 98 is even more indispensable than last year's version, the computer/Internet dictionary, which lacks such basic terms as *ISP, Java,* and *POP,* leaves plenty of room for improvement next year. —*James A. Martin*

Microsoft Bookshelf 98

GRADE: **A-**; PRICE: $55 street; Microsoft; 800/426-9400; www.microsoft.com

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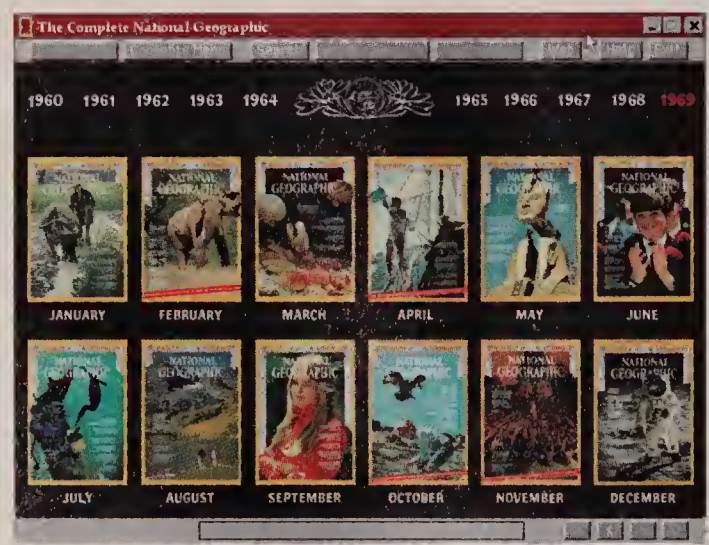
RESTLESS NATIVES

INFORMATION JUNKIES, rejoice! The mammoth 30-disc **Complete National Geographic** contains every page of every issue of the award-winning magazine since 1888, including the advertisements (a great source of Americana), all indexed and searchable. You'll find informative articles with breathtaking pictures of everything from yawning chimps to stunningly colorful seashells to, yes, naked natives. Though the interface is intuitive, you'll never consume all 7500 articles—especially since some of the text scans (unlike the photos) are blurry. Too much knowledge for one human to handle? Nah. Simply enjoy the fact that Machu Picchu is at your fingertips—whenever you so desire. —*Harold Goldberg*



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Complete National Geographic

GRADE: **B+**; PRICE: $199 street; Mindscape; 800/234-3088; www.mindscape.com

READER SERVICE NO. 633

SLAPHAPPY

EVEN IF YOU can't ice-skate to save your life, you can launch furious slap shots with **NHL Powerplay '98.** For a computer sports game, this is easy to get the hang of. And if you don't have a souped-up PC, you can choose the 2D version during installation, which requires a Pentium-75. But, as you'd expect, the 2D game isn't as cool. The 3D version, which needs a P-133 and a 3D graphics board, looks a lot more realistic, and the camera sweeps in and out of the action so you feel like a part of the game. You can even throw down the sticks and land a few punches. Hey, it's the NHL, so what's more realistic than a brawl? —*Brad Grimes*

NHL Powerplay '98

GRADE: **B+**; PRICE: $50 street; Virgin Interactive Entertainment; 800/874-4607; www.vie.com

READER SERVICE NO. 634

COLOR ME CREATIVE

I'M A GREETING CARD junkie, but I may never go to a stationery store again. With **PrintMaster Gold Deluxe 4.0,** I can create cards, brochures, posters, newsletters, and more on my home computer. With 25,000 graphics to choose from, I won't run out of designs I like. If I'm not feeling creative, I can select from more than 1500 sentiments, and I can either choose a ready-made design or make my own. Photo-editing software is included, so I can paste my own digitized pictures into my creation. The best new feature lets me e-mail cards to friends or post them on PrintMaster's Web site (www.printmaster.com). —*Angela Freeman*

PrintMaster Gold Deluxe 4.0

GRADE: **A**; PRICE: $50 street; Mindscape; 800/234-3088; www.printmaster.com

READER SERVICE NO. 635 ■

F Y I

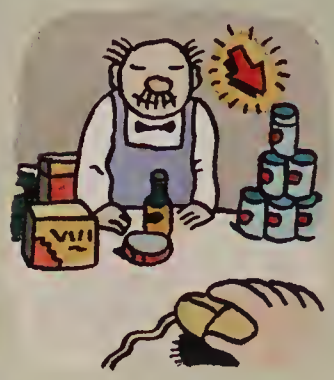
DESPITE ALL the glitches and risks, two-thirds of the people who shop online intend to purchase through the Internet in the future. Mostly, they plan to buy more airline tickets and make more hotel reservations.

SOURCE: AT&T SOLUTIONS/MERCER MGMT CONSULTING

KEEPING UP

Food on the Web

GROCERY SHOPPING is one of life's necessary evils. I'd be happy if my cupboards magically filled themselves without my ever having to leave the house. That will never happen—but www.netgrocer.com at least allows me to shop while accomplishing something productive like...er...surfing the Web. The site uses FedEx to deliver the nonperishable goods I order. Waiting for its graphics to draw is a little like waiting in line at a supermarket checkout counter (though you gotta get dressed to go to the store). But this site makes selecting products easier. You can search for juice by sugar content, for soap by price, for sauces by calorie count. And the prices are pretty good—in some cases better than the warehouse outlets'. But you must pay for shipping.



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Rent, Don't Buy

IF ALL YOU WANT to do is rent a car, that too is possible on the Web. Alamo's new site at www.goalamo.com lets you make your own arrangements. Tell it where you're going, when you'll arrive and depart, and what kind of car you want; the site checks availability and reports back. I entered all my information, waited 5 or 6 minutes—and then lost my online connection. I eventually got through, but the experience gave me a new understanding of those surly teens who answer the phone at car rental outfits. —**Christina Wood**

ILLUSTRATION: MARC ROSENTHAL

Secretly

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PC WORLD

TOP 5 HOME PCs

	SYSTEMS	Street price (7/1/97)	Overall rating	PC WorldBench score	Reliability/ service rating	Setup rating	Comments	Reader service number
1	Dell Dimension XPS M233s 800/388-8542 www.dell.com	$2379	90	242 outstanding	best/ best	fair	**FEATURES:** Pentium MMX-233, 32MB of SDRAM, 4.3GB hard drive, 16X CD-ROM drive, 33.6-kbps fax-modem, Iomega Zip drive, 17-inch monitor. Includes Microsoft Office 97 Small Business Edition and Encarta 97 or Bookshelf 97. **PRO/CON:** Reasonably priced, meaty hardware; limited software bundle, mail-order only.	611
2	Gateway 2000 G5-200M 800/846-2000 www.gateway.com	$2129	85	239 outstanding	fair/ best	outstanding	**FEATURES:** Pentium MMX-200, 32MB of RAM, 3.1GB hard drive, 24X CD-ROM drive, 56-kbps fax-modem, 17-inch monitor. Includes Microsoft Office 97, Pod, Third Dimension, Ultimate Human Body 2.0, Quicken SE, Money 97, and Encarta 97. **PRO/CON:** Cheap and very fast; mail-order only, so-so reliability rating.	612
3	Micron Millennia MME 800/223-6571 www.micron.com	$2689	85	241 outstanding	good/ best	good	**FEATURES:** Pentium MMX-233, 32MB of RAM, 3.2GB hard drive, 24X CD-ROM drive, 56-kbps fax-modem, Iomega Zip drive, 17-inch monitor. Includes Microsoft Office 97 Small Business Edition, Adobe PhotoDeluxe, Apache Longbow, Mercenaries 3D, and Command and Conquer. **PRO/CON:** Very fast; mail-order only, slightly expensive.	613
4	Quantex QP6/200 SM-2 800/896-4898 www.quantex.com	$2199	84	225 very good	fair/ best	fair	**FEATURES:** Pentium Pro-200, 32MB of RAM, 3.1GB hard drive, 12X CD-ROM drive, 33.6-kbps fax-modem, 17-inch monitor. Includes Corel WordPerfect Suite 7 and Compton's Interactive Encyclopedia. **PRO/CON:** Fast, suited to home office tasks and family fun, great price; no MMX support, mail-order only.	614
5	Micron Millennia XRU 800/223-6571 www.micron.com	$3999	81	263 outstanding	good/ best	outstanding	**FEATURES:** Pentium II-266, 64MB of RAM, 6GB hard drive, DVD-ROM/2DX CD-ROM drive, 56-kbps fax-modem, Iomega Zip drive, 19-inch monitor, Microsoft Sidewinder joystick, 3D video card with 4MB of RAM. Includes Office 97, PhotoDeluxe, and Silent Steel (DVD). **PRO/CON:** Speed whiz; very pricey, mail-order only.	615

Best Buy — All products: 902

HOW WE TEST The overall rating is based on reliability and service (40 percent), price (20 percent), PC WorldBench performance (20 percent), setup (10 percent), and extra features (10 percent). Reliability and service ratings are based on results of *PC World's* Reliability and Service survey.

THREE BRAND-NEW MACHINES made mincemeat of our PC WorldBench tests this month. Two of them, the Millennia XRU and Millennia MME, are from Micron; the XRU posted the fastest score we've ever seen in the Top 5 Home PCs. The third system is Gateway 2000's fast and inexpensive G5-200M.

Despite all these newcomers, Dell's Dimension XPS M233s leads the pack for the second month in a row, thanks to a reasonable price and first-class reliability and service ratings. With its meaty hardware bundle, the M233s serves well as a powerful home office system. But don't expect a multitude of software titles—you get only Microsoft Office 97 Small Business Edition and Encarta 97 or Bookshelf 97.

New at number two is Gateway's G5-200M with its low price of $2129. This fast Pentium MMX-200 comes with 32MB of RAM, a 3.1GB hard drive, a 56-kilobits-per-second fax-modem, and a 17-inch monitor. Software includes Microsoft Office 97, Encarta 97, Ultimate Human Body 2.0, and Quicken SE. It's ideal for a home office or for family entertainment.

Micron's new Millennia MME comes in at number three. It sports a Pentium MMX-233 processor, 32MB of RAM, a 3.2GB hard drive, and a 17-inch monitor. It's also very fast, but slightly pricey at $2689. Software includes Office 97 Small Business Edition and games. It's another excellent choice if you want a home machine for work or fun.

Moving up to number four is Quantex's Pentium Pro 200–based QP6/200 SM-2. Hewlett-Packard's Pavilion 5320 loses this spot because HP's service rating dropped and Quantex's improved. Suitable for a home office, the QP6/200 offers very good performance at an affordable $2199. But gamers note—this is not an MMX PC.

If gaming *is* your passion, then Micron's ultraspeedy Millennia XRU is for you. Its thunderbolt PC WorldBench score of 263 is a full 21 points ahead of the next fastest PC, Dell's Dimension XPS M233s. The XRU is also ultraexpensive at $3999, but it's loaded with features: a Pentium II-266 chip, 64MB of RAM, a 6GB hard drive, and a joystick. It's also the first PC on our chart with a DVD-ROM drive and a 19-inch monitor. Check out those DVD movies on that big screen. Whew!

—*Kirk Steers*

GATEWAY'S G5-200M has super speed at a very affordable price.

Kirk Steers is a contributing editor for PC World. *Testing performed by Ulrike Diehlmann of the PC World Test Center.* ■

ILLUSTRATION: JEFFREY PELO

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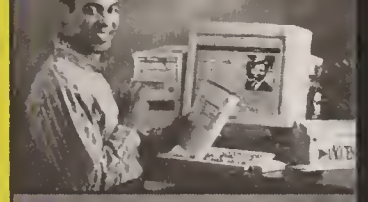

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Today's Target: Microsoft

EXCITING NEWS: Microsoft just purchased the entire calendar year of 1998. The company is also buying Texas. And Bill Gates is running for President. That's all true—at least according to the zillions of Microsoft jokes floating around the Internet.

Everyone picks on the software giant. Well, back up the dump truck, folks, it's an easy target. It wasn't always that way. Microsoft—and Uncle Bill—used to be my heroes. I admired their entrepreneurial, guerrilla-marketing style; I even emulated them in my seminar business. But the company has grown arrogant and overbearing, with a cavalier attitude toward its bugs (a verboten word in Redmond) and a take-no-prisoners approach toward its competitors. (There, I've said it. Lightning didn't strike and I feel lots better.)

I have plenty of examples of Microsoft bugs and a few workarounds.

One thing that ticks me off is the bloated software. Listen, it's not your hard drive, Bill, it's mine! (Unless, of course, you bundle a hard drive with your software.) Office 97—at a minimum—gobbles up about 120MB of hard disk space.

Even if I go along with the "you want features, it takes room" argument, how about this: Microsoft's Picture It photo editing program snapped up 30MB on my hard drive without even saying please. The next version is expected to hoard 45MB. I'm sorry, Bill, but that's just plain rude.

Next? If you're going to do something stupid to slow down my productivity, let me know right away. I'm talking about the interaction between Outlook and Word 97. Here's what happens: Every time I close a file in Word, it takes 5, sometimes 7 seconds. I can see the "save" lines showing me that the file's saving. That's fast. Closing is slow.

The problem? Outlook creates journal entries every time a file is closed in Excel and Word. That is by *default*, even if, like me, you're not using Outlook. (Worse things happen if you do use Outlook; see this month's *Answer Line*.) It's an example of Microsoft's tomfoolery I can do without. (To fix it in Outlook's Tools menu, click *Options•Journal*, clear all the check boxes in the 'Also record files from' list, and click *Apply*.) Since I dumped those journal links, files in Word close faster than I can crash a 747 in Flight Simulator.

> Microsoft has grown **arrogant** and overbearing, with a **cavalier** attitude toward its **bugs.**

Don't even think of stopping me; this is feeling just too good.

Another thing that drives me wild is the company's insular perspective. I complained to one Microsoft representative about program bloat. My suggestion—pretty obvious, I thought—was to leave unnecessary program files on the CD-ROM. "Now *that's* a good idea," she said. Hello?

Microsoft also has a way of blaming *me* for not being able to deal with *its* bugs. By now you're probably aware that users of older Word versions couldn't read files saved in the first release of Office 97. (A patch is available at www.microsoft.com/officefreestuff.) For more in the same vein, check out *Full Disclosure*, September.

But when company reps were confronted about this at a user group demo of Office 97, they did a little song and dance. "We haven't educated the end user correctly," they lobbed into the audience. "There's a conversion utility on the Web site," they appealed pathetically as we pelted them with rotten tomatoes. Hey, guys, fess up.

MOUSING AROUND

WANT ANOTHER example of Microsoft isolationism? A few months ago, I raved about how good the company's IntelliMouse is, and I still feel that way. (See *Home Office*, February.) The problem, I pointed out, was Microsoft's contemptuous attitude toward those still using its older products. It made the IntelliMouse's features available only to users of a few third-party applications and of its newer products—the Office 97 suite, Publisher 97, Encarta 97, and so on. Some people cynically say it's a ploy to get customers to upgrade.

I'm delighted to report that some bright folks at Plannet Crafters came up with a solution to the IntelliMouse problem. It's a $10 mouse driver called Flywheel. If you use the IntelliMouse, you'll love Flywheel; it makes the mouse work with everything I've tried. Download a trial copy at www.plannetarium.com.

I'm not finished with Microsoft yet. Next month I have a few stunning add-ons for Word 95 and 97 and a way to make Windows 95 crash less. Plus a few more bones to pick.

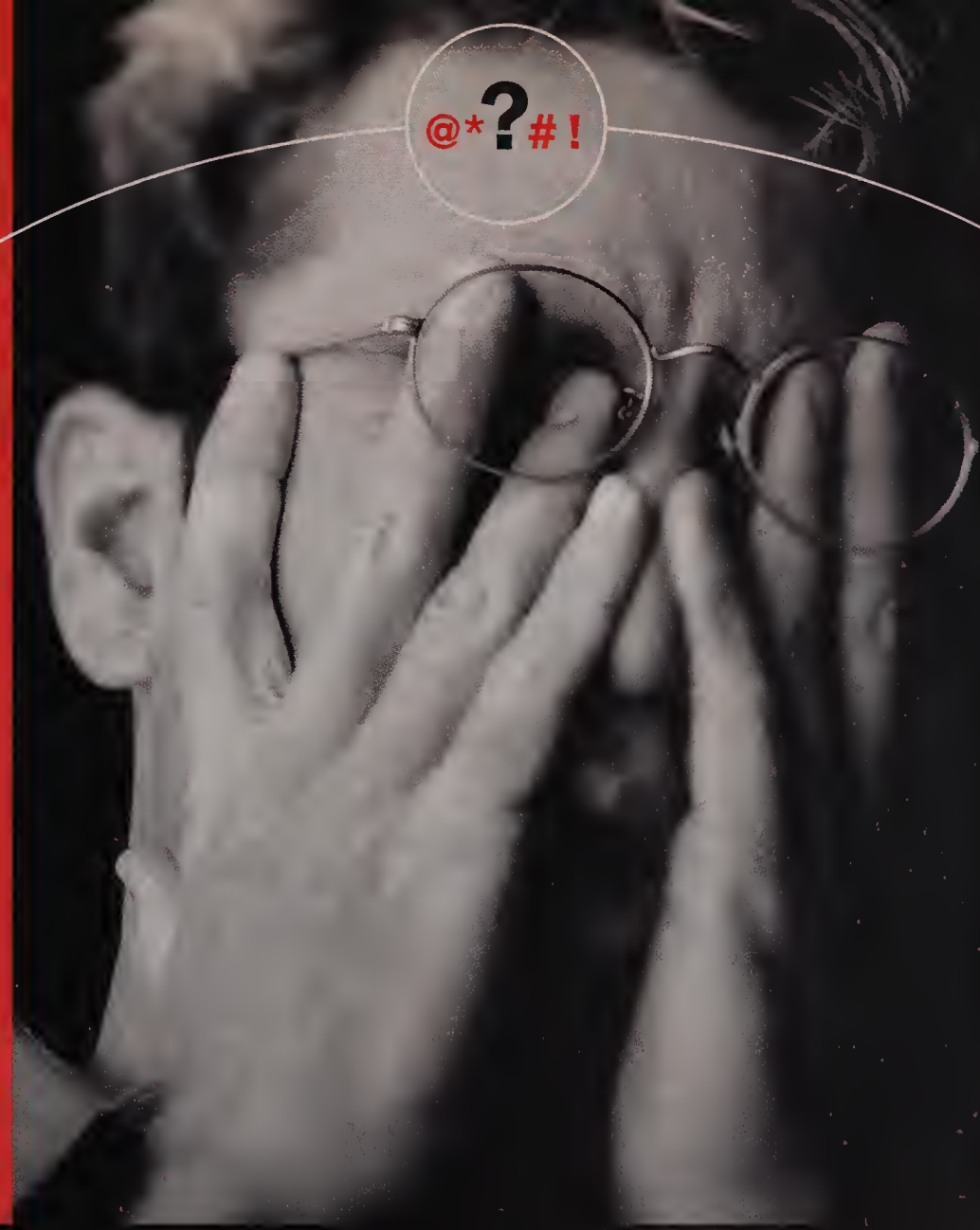
Flywheel

$10; Plannet Crafters; 770/752-5416 (fax); www.plannetarium.com

READER SERVICE NO. 636

Contributing Editor Steve Bass is a licensed marriage and family therapist and is the president of the Pasadena IBM Users Group. See page 14 for contact information. ■

ILLUSTRATION: MARC ROSENTHAL



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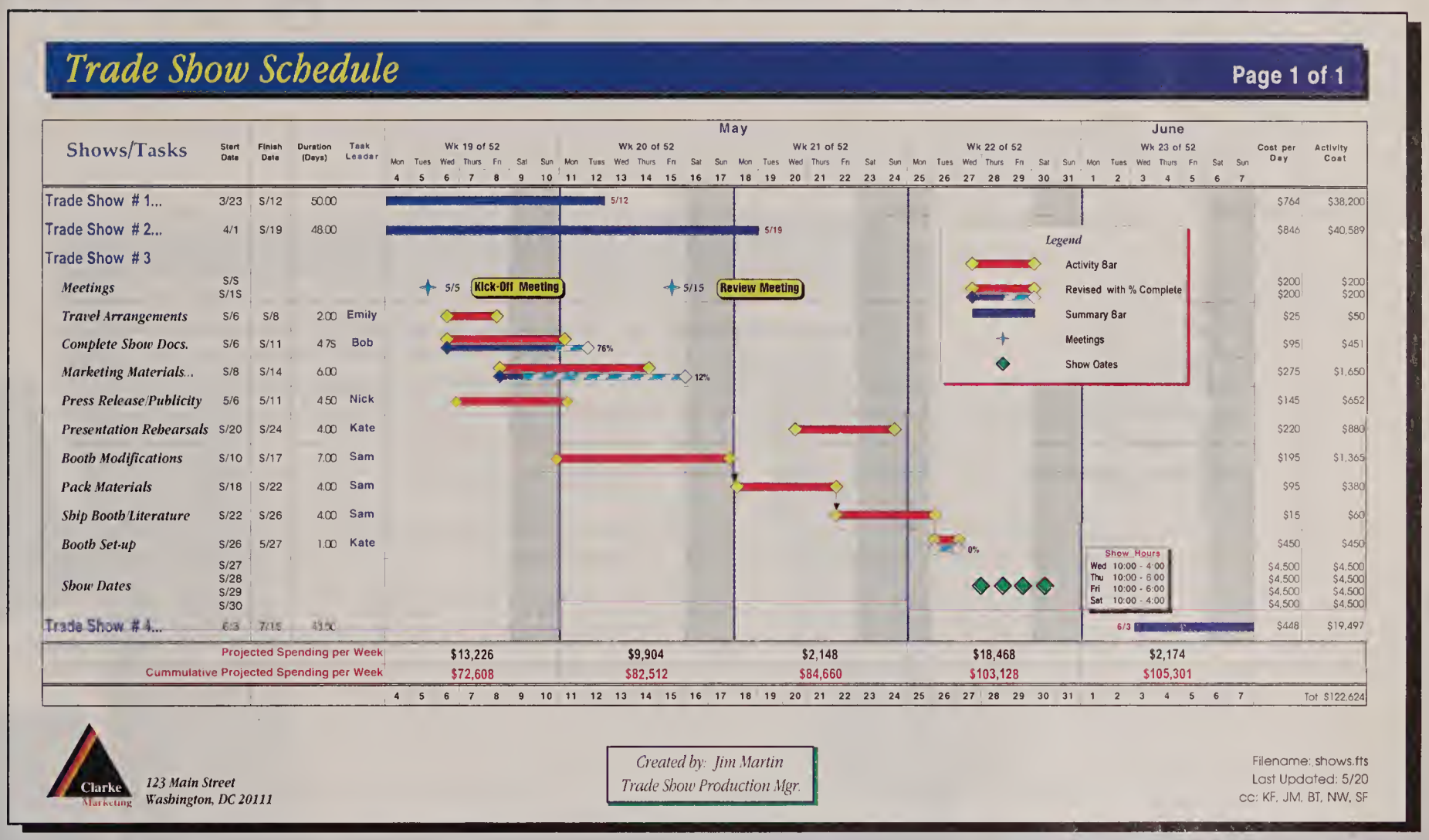

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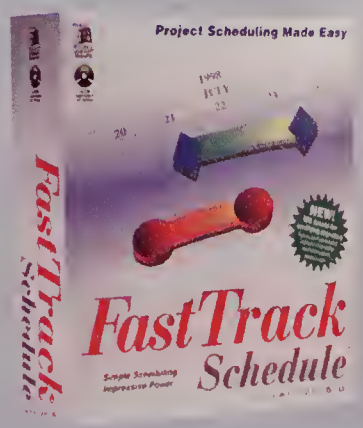

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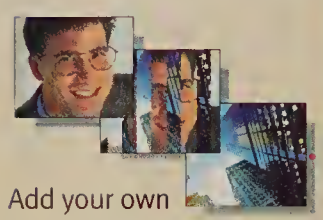

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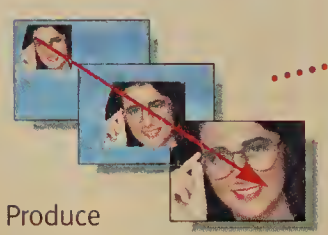

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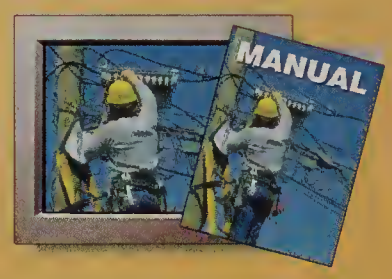

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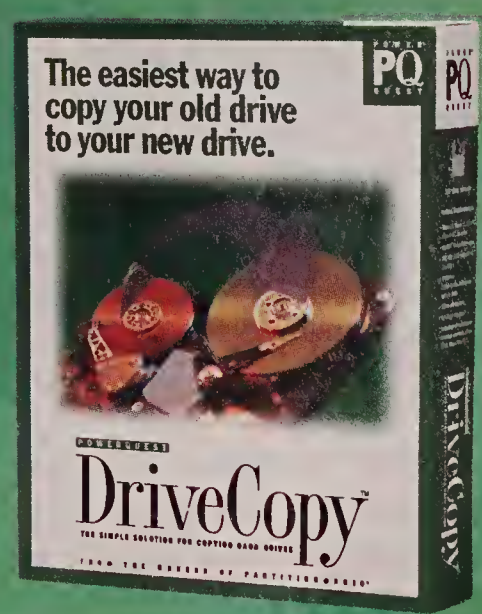

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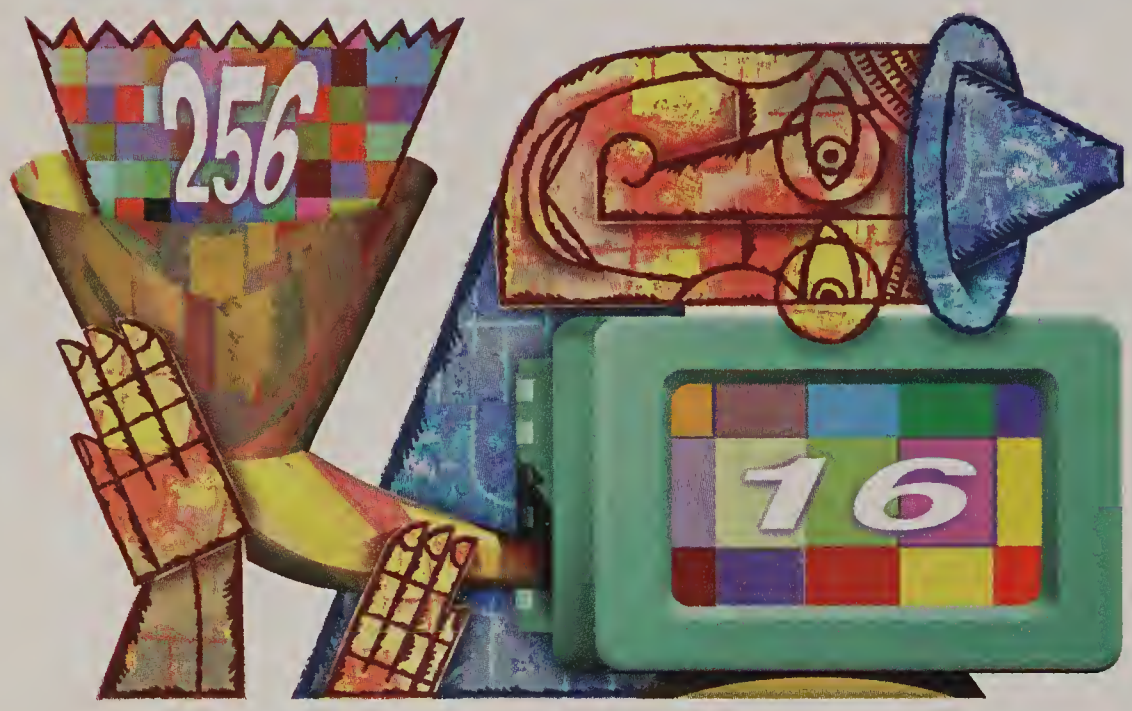


ANSWER LINE

Eeny, Meeny, Miney, Mo' Colors on Screen

I HAVE A 486 with the graphics adapter built into the system board. I want to use a program that requires VGA graphics, but when I try to open it while using Windows 3.11's generic 16-color VGA driver, the program refuses, complaining that it requires 256 colors. I'm sure the adapter must support 256 colors. I've tried just about every 640-by-480 256-color driver I can find, to no avail. How do I find the right driver?

Anthony F. Wright, Internet

AS YOU DISCOVERED, just picking drivers at random doesn't work. Your best bet is to try to deduce exactly which video controller chip you have, then install the right driver for it. The easiest way to do this is to turn off the computer, then turn it back on. The first thing you should see on your screen, even before the BIOS version information shows up, is a message displayed by the video BIOS. This should tell you the video adapter or chip manufacturer, including the exact chip model.

Armed with that knowledge, you can try to track down a Windows 3.1 driver for that specific video adapter (usually available from the adapter manufacturer) or a generic driver for the chip (sometimes available from Microsoft or the chip manufacturer). If this information doesn't appear on the screen—or flashes by too quickly—you can also open the computer and inspect the system board. Most video controller chips are labeled. If you can't determine the chip manufacturer, try installing Microsoft's generic SVGA (640 x 480 x 256) driver, available online at Microsoft's FTP server (ftp.microsoft.com/softlib/mslfiles/svga.exe).

BLAME IT ON THE CD-ROM, OR ON THE DRIVE?

I HAVE TWO new CD-ROM based-programs that seem to be incompatible with my CD-ROM drive. I can insert the discs in the drive and even get a directory listing of their contents, but I can't install or run the programs listed. Windows just keeps telling me there is no disc in the drive. My old CD-ROMs still work fine, and I've even ordered replacement discs from the manufacturer, but they don't work either. Is it my circa-1991 CD-ROM drive, or the discs?

Phillips H. Fox, Port Lavaca, Texas

YOU'LL NEED TO pop them into another CD-ROM drive to find out for sure, but it's possible that the problem is in the CD-ROM disc. Your relatively ancient drive may have a hard time reading higher-density (74-minute) CD-ROMs or discs that mix audio and data tracks or contain a zero track. I've also read reports of people having difficulty reading CD-ROMs formatted using Microsoft's Joliet CD-ROM file system. Joliet extends the standard ISO 9660 CD-ROM file system to support Windows 95–style long file names. If the CD-ROM drive's contents include file names longer than 8 plus 3 characters, this could be your problem. On a related note, it's also very likely your drive will have trouble reading CD-Recordable discs (identifiable by their gold color).

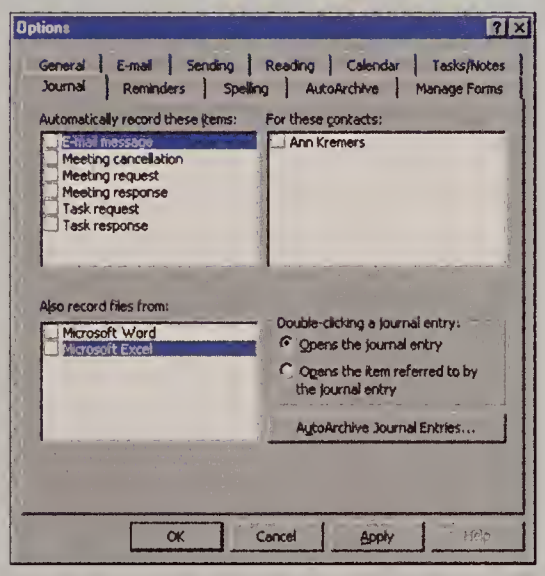
Having said all that, it's much more likely that your drive is simply dirty, or tired. The laser it uses to read data from the CD-ROM has a lens that may have accumulated dust and other crud since it got its start back in the Bush Administration. Before you explore more expensive solutions, consider buying a CD lens cleaner at your local computer store. They usually cost less than $20, and consist of a disc fitted with gentle brushes that you pop into

By Scott Spanbauer

ILLUSTRATION: RICHARD DOWNS

Speed Office 97 by Turning Off File Logging

HAVE YOU NOTICED that opening and closing your Word and Excel files takes longer since you upgraded to Office 97? The latest edition of the suite includes a new feature, enabled by default within Outlook, that logs all of your Word and Excel file operations. Unfortunately, this really slows things down. According to David Barton of Berkeley, California, the problem gets worse if you use macros that open and close several files. One of Barton's Excel macros that ran in 30 seconds in Office 95 took more than 40 minutes in Office 97. The solution is to turn this feature off: In Outlook, choose *Tools•Options*, select the *Journal* tab, and uncheck *Microsoft Word* and *Microsoft Excel* in the 'Also record files from:' box.



the drive for a minute or so. A coworker might even have one you can borrow.

If cleaning does no good, and the CD-ROM itself doesn't appear to be the problem, the prognosis goes from bad to worse. The drive's laser or motor is probably on its last legs, in which case your best move is to replace it. But this news isn't so bad—newer, speedier, and more capable drives are inexpensive.

REGISTRY REPAIR 101

WHENEVER I START Windows 95, I see a 'Registry Error' message, after which Windows asks me to click an OK button so that it can repair the Registry from a backup copy. Windows then restarts, but the next time I turn the computer on I get the same error.

Ketan Patel, Rutherford, New Jersey

NOTHING IS EASIER to mangle, and harder to fix, than the Windows Registry. Each time Windows 95 starts up, it creates backup copies of the Registry's system.dat and user.dat files. If the Registry becomes damaged, Windows 95 will try using the backup copies. Unfortunately, through the wonders of technology, it is possible for *both* copies of the files to become corrupted, which sounds like your situation.

Until recently, Registry repair tools have been pretty much nonexistent. I recommend that you try Helix Software's Nuts & Bolts system maintenance utility; it's not guaranteed to solve your problem, but it may help. In addition to disk management, crash-proofing, and security tools similar to those in Symantec's Norton Utilities, Nuts & Bolts offers a nice Registry repair tool that could get you booting smoothly again (see the figure on the next page). So does CyberMedia's First Aid 97.

If these utilities can't do the job, here's a last-ditch tactic. It's based on a file called system.1st, which is a copy of your Registry from the day you first installed Windows 95; you may have to reinstall hardware that you added after the initial Win 95 installation.

1. To remove the hidden, system, and read-only attributes of the file called system.1st in your computer's root directory, type the command **attrib -h -s -r system.1st** in a DOS window. Then copy system.1st to your \Windows directory (the command **copy c:\system.1st c:\windows** should do it, unless Windows 95 is installed in a different drive or directory).
2. Remove the hidden, system, and read-only attributes of the system.dat file by using this DOS command: **attrib -h -s -r system.dat.**
3. Delete system.dat, then rename system.1st to system.dat and reset the attributes using **attrib +h +s +r**.

When you restart Windows, you won't get the error message.

• Nuts & Bolts $50 street; Helix Software; 800/451-0551, 718/392-3100, 718/392-4212 (fax); www.helixsoftware.com.

READER SERVICE NO. 617

• First Aid 97 $35 street; CyberMedia Inc.; www.cybermedia.com.

READER SERVICE NO. 618

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DON'T MISS ADDITIONAL HERE'S HOW information at www.pcworld.com/hereshow.html.

SPEED WINDOWS 95 STARTUP

HERE'S A TIP that can save you time and money. After a couple of years of installing and uninstalling programs and peripherals, you may notice that it's taking longer to start up and shut down Windows 95. The problem is that hardware and software uninstall routines don't always clean up after themselves. As a result, Win 95's Registry gets bloated. Starting up and shutting down both involve reading and writing the Registry files (and their backups), which contributes to the slowdown. ▶

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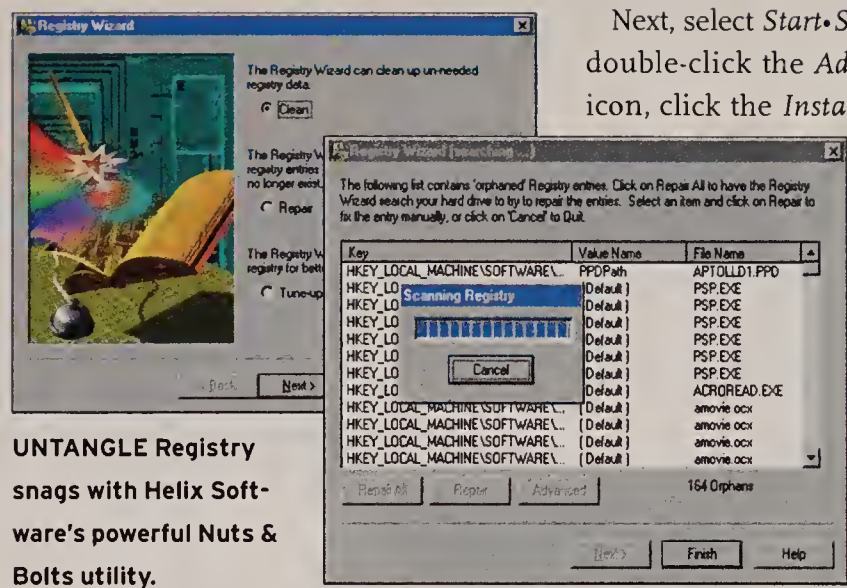

UNTANGLE Registry snags with Helix Software's powerful Nuts & Bolts utility.

Helix's Nuts & Bolts does a great job of optimizing the Registry, but at a price (see preceding item). If you just need a light sprucing up, try Microsoft's free RegClean 4.1. This utility removes unused or corrupted Registry keys created by apps that use OLE automation. If your Registry is bogged down with such entries, download RegClean from Microsoft's FTP server (ftp.microsoft.com/Softlib/MSLFILES/Regcln41.exe).

DELETING ALL TRACES OF A PROGRAM

I recently installed several programs that launch automatically when Windows 95 starts up. I didn't care for them, and deleted them from the hard drive. Unfortunately, Windows 95 still tries to launch the programs when it starts up, and posts an error message I have to click on in order to proceed. How can I prevent Windows from searching for these nonexistent applications?

Chris Brunner, Springfield, Missouri

BAD USER! Instead of using the programs' own uninstall features, which should delete files, and remove Registry entries and other settings, you just went in there and deleted the program files. With Windows 95, such straightforwardness can land you in trouble.

First, look for and delete a Shortcut to the program in your StartUp menu. To delete StartUp menu items, right-click the Taskbar, select *Properties*, select the *Start Menu Programs* tab, click the *Remove* button, and select the program you want to delete. Click *Close*, then click *OK*.

Next, select *Start•Settings•Control Panel*, double-click the *Add/Remove Programs* icon, click the *Install/Uninstall* tab, and look for the troublesome program in the listing in the bottom half of the window. Assuming you haven't already deleted the files necessary for uninstalling the application, just double-clicking the program's entry in the list should remove do the trick.

If this doesn't remove the program, open the win.ini file (located in the \Windows directory) in Notepad. Look for load= and run= commands near the top of the file—anything listed after these commands will run automatically when you start Windows. Remove the offending apps if you can identify them, or place a semicolon in front of the suspect lines to prevent everything on the line from loading. Save the file and exit Notepad.

If none of the above solves your problem, the program probably launches via a Windows 95 Registry entry. You might be able to find and delete the entry using Windows' Registry editor, but that could be frustrating. If you still have the offending program on disk or can download it again, simply reinstall the program and then use its own uninstall utility. You'll probably find a Shortcut to the uninstall tool in the program's Start button submenu; occasionally, you'll find the uninstall tool only on the installation CD-ROM or floppy. And, just to make it extra easy on you, some programs (such as Microsoft Office) bury their uninstall routines in the *install* program.

Find files mentioned in this article at www.pcworld.com/files and more tips at www.pcworld.com/hereshow. Answer Line *welcomes your questions and pays $50 for published items. Senior Associate Editor Scott Spanbauer is author of* The No B.S. Guide to Windows 95 *(No Starch Press, 1996, 800/420-7240).* *See page 14 for contact information.* ■

Make your own icons ◆ Download a Notepad replacement ◆ Train Task Manager

Track Down Unused Files

HOW DO YOU get rid of files left over from programs that you've removed? In the April issue, I listed a few tips to help you ferret them out (see "Unmasking Orphaned System Files"). That approach uses Windows Write, Quick View, or another file viewer to peek at the contents of system files. But Tomi Drpic, writing from Cochabamba, Bolivia, points out a better way—one that is faster, doesn't require additional software, and avoids the risk of accidentally corrupting a file with Windows Write.

In Windows Explorer (Windows 95) or File Manager (Windows 3.*x*), select a file

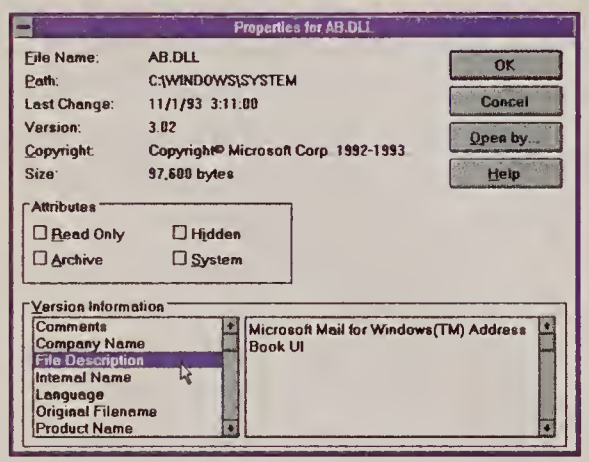

FIGURE 1: FIND THE IDENTITY of system files by taking a quick peek at the Properties dialog box.

you're curious about, such as a .dll file, then choose *File•Properties* (or press **<Alt>-<Enter>**). In Windows 95, look in the Properties dialog box for a tab called *Version*, and click it. In Windows 3.*x*, look for the Version Information at the bottom of the Properties dialog box (see **FIGURE 1**), and click on *Comments, Company Name, File Description*, and so on to find out more about the file. (If there's no Version tab or the Version Information box is dimmed, you're out of luck.)

Not all files will have an entry for Product Name, but sometimes just seeing the company name can tell you what program installed the file and therefore whether that file can be removed.

Move these outdated system files to a temporary folder or to a floppy disk and wait a while before deleting them to make sure they aren't needed by your system.

Happy housekeeping!

GIVE WINDOWS A NEW LOOK AND SOUND EVERY DAY

ONE DELIGHTFUL thing about Windows 95 is the way it lets you customize wallpaper, sounds, and other decorative elements to your liking. The problem is, nobody wants to look at the same picture or hear the same sound all the time.

To the rescue comes Richard Reynolds of Camp Springs, Maryland, with a simple, clever technique for changing the start-up screen automatically each time you start Windows 95. This routine can also cycle through different wallpaper files, sounds, and more. The trick is to make a batch file that renames each file in your collection of sounds (or bit maps) whenever your computer is started. That way, each sound or picture takes a turn. Reynolds's batch file, which I have modified slightly, is shown in **FIGURE 2**.

Let's take your start-up sound as an example. For best organization, put all your auxiliary sounds in one folder and rename them sound01.wav, sound02.wav, and so on. Next, assign a sound for your start-up: Choose *Start•Settings•Control Panel*, double-click the *Sounds* icon, select *Start Windows* in the Events list, then type a path and name for the sound file in the Name box. This file can be in any folder and have any name. (But store a copy of the file with the other sounds that you renamed, or you'll lose it.) Click *OK*.

```
cd\windows\my_wavs
ren sound01.wav soundxx.wav
ren sound02.wav sound01.wav
ren sound03.wav sound02.wav
ren sound04.wav sound03.wav
ren soundxx.wav sound04.wav
copy sound01.wav c:\windows\media\sound.wav
```

FIGURE 2: CHANGE START-UP SOUNDS automatically with a simple batch file like this one.

Next, make a batch file like the one in the figure. You may need to make a few adjustments: First, make sure the path in the first line reflects the location of your extra sound files. In addition, if you have more than four start-up sounds—say, eight—you'll have to modify the next-to-last line (change it to read **ren sound05.wav sound04.wav**), add more lines (one for each sound, following the pattern of the other lines), then add a line that reads **ren soundxx.wav sound08.wav**. You'll need to adjust the path and name of the sound file on the last line to reflect the one you designated in Control Panel.

Save this batch file with a name like **switcher.bat** in a folder where you keep other batch files (such as your Windows folder). To make the batch file run automatically each time you start your computer, choose *Start•Run*, type **notepad c:\autoexec.bat**, and click *OK*. To this file, add the line **call c:\windows\switcher.bat** (your path may differ). Then save the autoexec.bat file and exit Notepad.

The batch file renames each of your sound files and then copies one of them to a location where Windows expects to find its start-up sound. Keeping your sounds (or bit maps) in a separate folder simplifies troubleshooting and keeps the target folder cleaner.

To use a similar batch file for changing wallpaper, follow the same steps, this time using the names of .bmp files and making sure the copy line overwrites the bit map currently selected in the Display Properties dialog box (choose *Start•Settings•Control Panel*, double-click the *Display* icon, click the *Background* tab, and select a Wallpaper from the list).

To make a batch file that constantly changes your Windows start-up screen, have the batch file overwrite the logo.sys file in the root folder of your start-up drive. (For details on customizing this file, see "Custom Start-Up Screens in Windows 95," *Windows Tips*, May.) Be aware that the more files your batch ▶

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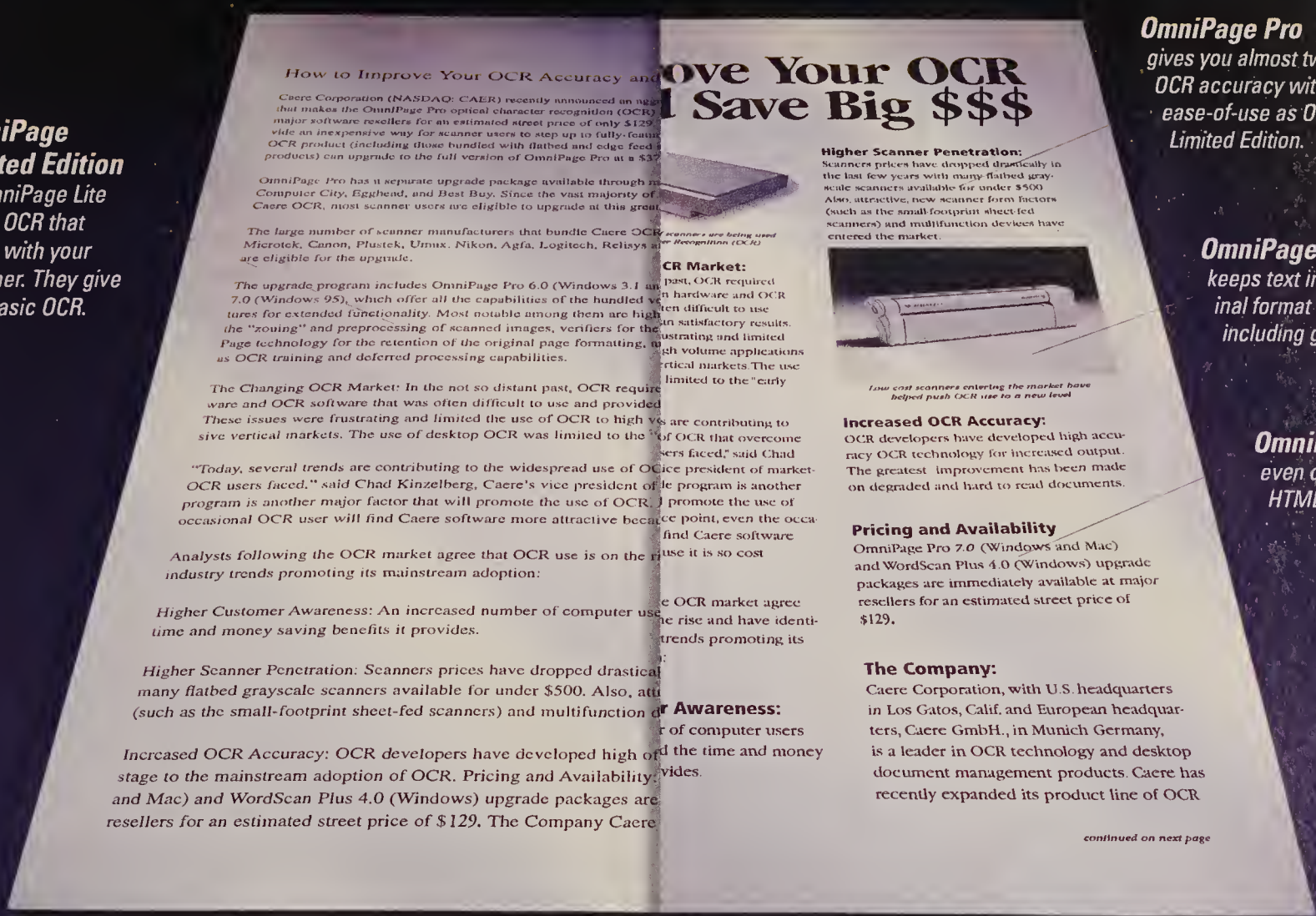

How to Improve Your OCR Accuracy and

Caere Corporation (NASDAQ: CAER) recently announced an upg
that makes the OmniPage Pro optical character recognition (OCR)
major software resellers for an estimated street price of only $129.
vide an inexpensive way for scanner users to step up to fully-featu
OCR product (including those bundled with flatbed and edge feed
products) can upgrade to the full version of OmniPage Pro at a $37

OmniPage Pro has a separate upgrade package available through m
Computer City, Egghead, and Best Buy. Since the vast majority of
Caere OCR, most scanner users are eligible to upgrade at this great

The large number of scanner manufacturers that bundle Caere OCR
Microtek, Canon, Plustek, Umax, Nikon, Agfa, Logitech, Relisys a
are eligible for the upgrade.

The upgrade program includes OmniPage Pro 6.0 (Windows 3.1 an
7.0 (Windows 95), which offer all the capabilities of the bundled ve
tures for extended functionality. Most notable among them are high
the "zoning" and preprocessing of scanned images, verifiers for the
Page technology for the retention of the original page formatting, m
as OCR training and deferred processing capabilities.

The Changing OCR Market: In the not so distant past, OCR require
ware and OCR software that was often difficult to use and provided
These issues were frustrating and limited the use of OCR to high vo
sive vertical markets. The use of desktop OCR was limited to the "

"Today, several trends are contributing to the widespread use of OC
OCR users faced," said Chad Kinzelberg, Caere's vice president of
program is another major factor that will promote the use of OCR.
occasional OCR user will find Caere software more attractive becau

Analysts following the OCR market agree that OCR use is on the r
industry trends promoting its mainstream adoption:

Higher Customer Awareness: An increased number of computer use
time and money saving benefits it provides.

Higher Scanner Penetration: Scanners prices have dropped drastical
many flatbed grayscale scanners available for under $500. Also, atti
(such as the small-footprint sheet-fed scanners) and multifunction d

Increased OCR Accuracy: OCR developers have developed high of
stage to the mainstream adoption of OCR. Pricing and Availability:
and Mac) and WordScan Plus 4.0 (Windows) upgrade packages are
resellers for an estimated street price of $129. The Company Caere

ove Your OCR
l Save Big $$$

scanners are being used
r Recognition (OCR)

CR Market:
past, OCR required
n hardware and OCR
ten difficult to use
in satisfactory results.
ustrating and limited
gh volume applications
rtical markets. The use
limited to the "early

s are contributing to
of OCR that overcome
sers faced," said Chad
ice president of market-
le program is another
promote the use of
ce point, even the occa-
find Caere software
use it is so cost

e OCR market agree
e rise and have identi-
trends promoting its

r Awareness:
r of computer users
d the time and money
vides.

Higher Scanner Penetration: Scanners prices have dropped drastically in the last few years with many flatbed gray-scale scanners available for under $500. Also, attractive, new scanner form factors (such as the small-footprint sheet-fed scanners) and multifunction devices have entered the market.

Low cost scanners entering the market have helped push OCR use to a new level

Increased OCR Accuracy: OCR developers have developed high accuracy OCR technology for increased output. The greatest improvement has been made on degraded and hard to read documents.

Pricing and Availability OmniPage Pro 7.0 (Windows and Mac) and WordScan Plus 4.0 (Windows) upgrade packages are immediately available at major resellers for an estimated street price of $129.

The Company: Caere Corporation, with U.S. headquarters in Los Gatos, Calif. and European headquarters, Caere GmbH., in Munich Germany, is a leader in OCR technology and desktop document management products. Caere has recently expanded its product line of OCR

continued on next page

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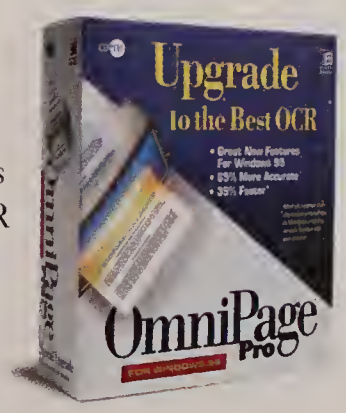

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Key Feature Comparison	OmniPage Pro	OmniPage Limited Edition
Caere's fastest and most accurate OCR engine	✔	
AutoOCR Toolbar™ for easy, one-button OCR processing	✔	
OCR Wizard to guide you through the process	✔	
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Retains original layout	✔	

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Circle 91 on reader service card

file processes and the more batch files you run from autoexec.bat, the longer your start-up sequence will be.

DO-IT-YOURSELF ICONS

95 AS LONG AS you're customizing sounds and wallpaper, why not individualize your icons too? If you think the only way to create custom icons is to shell out for a shareware icon painter (or something even more expensive), think again. Brent Vierling of Congerville, Illinois, points out that Windows 95 comes with its own icon-painting program in disguise—Microsoft Paint.

Just follow the steps below, which are illustrated in **STEP BY STEP**.

1. Choose *Start•Programs•Accessories•Paint*. Then use any of the painting tools to create a new masterpiece, or open a bit map (.bmp) file of any dimensions.

If you want to retouch an existing icon, start with a new picture by choosing *File•New*. Choose *Image•Attributes*, select *Pels* for Units, type **32** for both Width and Height, and click *OK*. Then use Explorer or My Computer to locate the icon you want to modify. Make the Explorer window small and choose *View•Large Icons*. Take a picture of the window by pressing **<Print Screen>**. Return to Paint and choose *Edit•Paste*. When prompted by Paint with the option to enlarge the bit map, click *No*. Drag until the icon appears in the frame, then click any tool to complete the paste.

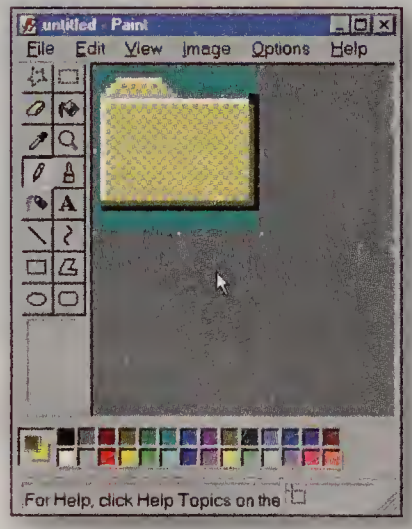
2. Now edit the picture to your heart's content. For an easier view of small pictures, choose *View•Zoom•Custom*, select a magnification level, and click *OK*. If you want to combine another picture with the current one, use the selection tool to mark the area for the new material, then choose *Edit•Paste From*. Locate and select another .bmp file and click *OK*. If the new picture is larger than the existing selection, Paint asks whether to make adjustments to use the whole pasted image. Click *Yes*.

3. Once you have your picture looking the way you want, choose *File•Save as*, and select a location for your new icon file. In the 'File name' box, type a name for your picture in double quotation marks, using the .ico file extension—**"myicon.ico"**, for example. The quotation marks ensure that Paint does not add its default .bmp file extension. Windows sees the .ico extension and automatically creates a 16-color icon from your picture, shrink- ▶

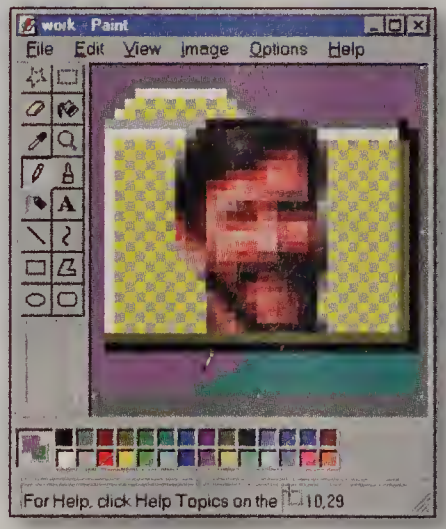
STEP BY STEP

Customize Your Desktop Icons With Windows' Microsoft Paint

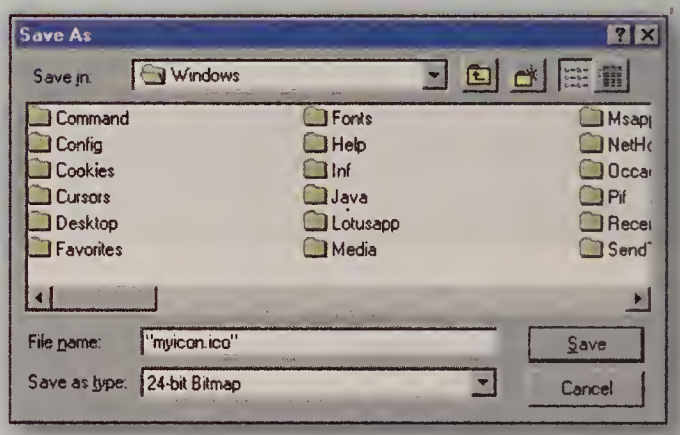
❶ In Microsoft Paint, create a new picture, open an existing picture, or paste in a screen shot.



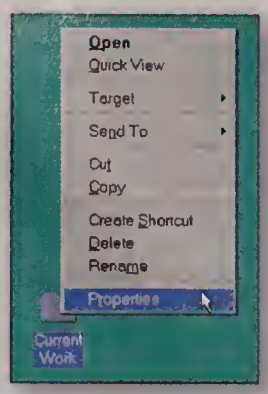
❷ Edit your picture with the paint tools, or paste in other elements. For an easier view of small pictures, choose *View•Zoom•Custom*, select a magnification level, and click *OK*.

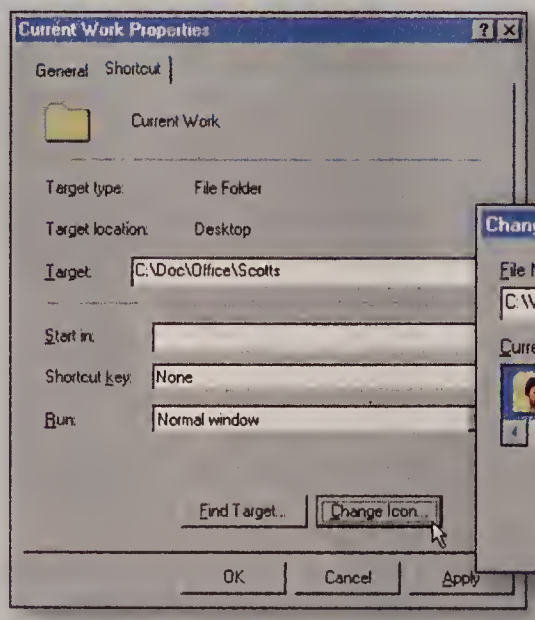


❸ Save the file with the .ico extension, using quotation marks so Paint doesn't add its default .bmp extension.

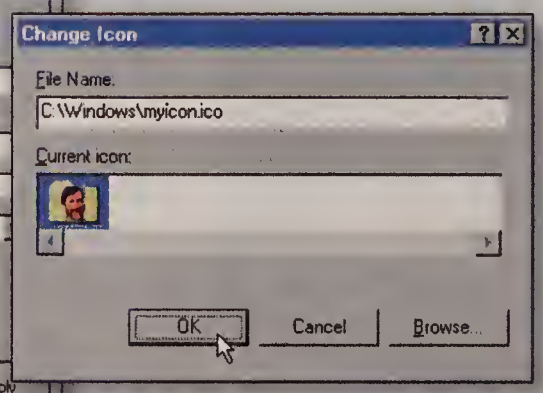


❹ To change a Shortcut's icon, right-click the Shortcut and choose *Properties* from the menu.





◀ ❺ Click the *Shortcut* tab, and click *Change Icon*. In the Change Icon dialog box, type the path and name of your new .ico file. Click *OK* until you've closed all the dialog boxes. ▼



❻ Presto! Your dull, generic Shortcut now has a new, personalized look.

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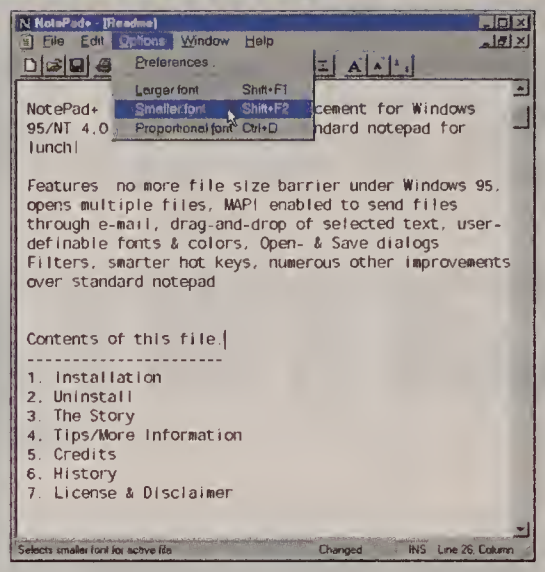
W I N D O W S T O O L B O X

At Last, a Great Notepad Replacement

SHAREWARE replacements for the Windows text editor Notepad are a dime a dozen, but most are as clunky as Notepad. Finally, there's NotePad+. It gives us the features we've always wanted—support for larger files, search and replace, customizable fonts and colors, a toolbar, and support for multiple documents, to name a few. What's more, it's free from PC World Online or from the developer's home page at lelystad.flnet.nl/~Omeurs01.



ing the image to fit as needed. (Remember, saving a bit-map file with the .ico extension does not make it a true .ico file that can be edited in an icon editor.)

4. To replace the icon of an existing Shortcut with your custom icon, right-click the Shortcut and choose *Properties*.

5. Click the *Shortcut* tab, then click *Change Icon*. Type the path and name of your icon file, or simply click *Browse* and locate and double-click your icon file. Then click *OK* a few times to close all the dialog boxes.

To change the icon for an entire file type (for example, all text files), open Explorer and choose *View•Options*. Click the *File Types* tab and select the file type from the list. Click *Edit* and then click *Change Icon*. Type in the name of your icon file, or use the *Browse* button to locate and double-click the icon file. Close all dialog boxes.

online *Find files from this article at www.pcworld.com/files and additional tips at www.pcworld.com/hereshow.* Windows Tips *welcomes your questions and tips and pays $50 for published items. Contributing Editor Scott Dunn is a principal author of* The PC Bible, 2nd Edition *(Peachpit Press, 1995, 800/283-9444). See page 14 for contact information.* ■

Five Tips for Getting the Most From Task Manager

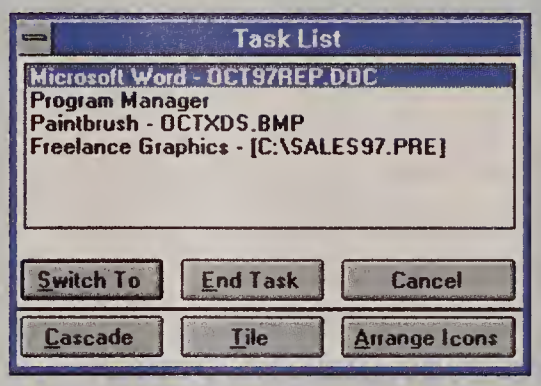
BECAUSE PRESSING **<Alt>-<Tab>** makes it so easy to switch applications, Windows' Task Manager is an overlooked and underused utility. But Task Manager can do more than switch apps. Here are some tips to get the most out of this tool (or dump it altogether):

Three ways to go. You can start Task Manager by clicking the control menu box (the one on the far left of a title bar) of almost any application and choosing *Switch To* from the control menu; by pressing **<Ctrl>-<Esc>**; or by double-clicking a blank area of the desktop.

Pick your tile style. The Task Manager provides a great way to control the open windows on your desktop. To clean up messy minimized icons, align them at the bottom of your screen by clicking the *Arrange Icons* button. To make all open windows overlap slightly, click *Cascade*. To make windows tile side by side, click *Tile*. To make windows tile top to bottom, hold down **<Shift>** as you click *Tile*. Finally, to get the biggest window size to work in while maintaining easy access to minimized icons, minimize all applications but the one you're working in, open Task Manager, and click *Tile*.

Make it stop. Want to close an application without hunting through open windows or minimized icons? Open Task Manager, select the application's name, and click *End Task*.

Tell it where to go. If you don't like where Task Manager appears when you open it by pressing <Ctrl>-<Esc>, you can change its default location. From File Manager or Program Manager, choose *File•Run*, type **system.ini** to open the file in a text editor like Notepad, and look for the line taskman.exe=taskman.exe underneath the [boot] heading but above the next



bracketed heading. (If the line isn't there, add it.) At the end of the line, add a corner coordinate: **1 1** for the upper left corner, **1000 1** for the upper right corner, **1 1000** for the bottom left corner, and **1000 1000** for the bottom right corner. The space before each number is important. For example, to make the Task Manager appear in the bottom left corner, the line should read **taskman.exe=taskman.exe 1 1000**. This trick works only when you open Task Manager by pressing <Ctrl>-<Esc> or by double-clicking the desktop, and it doesn't affect any applications that replace the Task Manager (see next tip). You must restart Windows to see the change.

Get a different task. If you don't use Task Manager but have a favorite app or accessory you want to open on a moment's notice, you can give it Task Manager's place. One way to do this: Edit the same system.ini line described in "Tell it where to go," replacing the term on the right side of the equal sign with the application's name—for example, **taskman.exe=calc.exe.** Next time you press <Ctrl>-<Esc> or double-click the desktop, Calculator will open instead of Task Manager.

Another trick is simply to make a backup copy of taskman.exe (in case you later change your mind), then copy or rename the application's executable file to taskman.exe. At the DOS prompt, for example, you would type **ren taskman.exe taskman.old** and press **<Enter>** to make a backup; and then type **copy calc.exe taskman.exe** and press **<Enter>**.

These two tricks won't work for applications that need to be in a directory other than Windows, of course. And in Windows for Workgroups 3.11, applications that open files (such as Write or Notepad) are less than ideal choices for a Task Manager replacement—every time you try to open them via the Task Manager shortcut, they complain that the coordinates Windows sends the Task Manager are not valid file names. Either live with the error message, or better yet, get a different Task Manager substitute.

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KM-411	14" / 13.0"	1024 x 768	Digital	.28mm
KM-511L	15" / 14.0"	1024 x 768	Digital	.28mm
KM-711L	17" / 15.8"	1280 x 1024	OSD	.28mm
Performance Series				
KM-520LP	15" / 14.0"	1280 x 1024	OSD	.28mm
KM-750	17" / 15.8"	1600 x 1280	OSD	.25mm
* KM-760B	17" / 16.1"	1600 x 1280	OSD	.25mm
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Delete All Empty Rows in a Flash

I IMPORT LOTS of text files into Excel. These files often contain many blank rows, which I end up having to delete one by one. Is there a more efficient way to get rid of them?

Gabriel Schervish
Belmont, Massachusetts

IF THE ORDER of the rows doesn't matter, the easiest approach is to highlight all the data and then sort by one of the columns. The empty rows will end up at the bottom of the worksheet, and your problem is solved.

If you can't change the order of the rows, you need to create a macro that loops through the rows and deletes the empty ones. This process is tricky, because while the macro is zapping the rows, the numbers of the remaining rows keep changing. The solution is to loop through the rows *backwards*, so that deleting a row doesn't affect the numbers of the other rows.

```
Sub DeleteEmptyRows()
  LastRow = ActiveSheet.UsedRange.Rows.Count
  Application.ScreenUpdating = False
  For r = LastRow To 1 Step -1
    If Application.CountA(Rows(r)) = 0 Then Rows(r).Delete
  Next r
End Sub
```

FIGURE 1: DELETE ALL EMPTY ROWS in an Excel worksheet in one quick step with this simple macro.

The macro in **FIGURE 1** does just that. If you're using Excel 5 or Excel 95, select *Insert•Macro•Module* to insert a new Visual Basic module into your workbook, and enter the code shown in Figure 1. In Excel 97, select *Tools•Macro•Visual Basic Editor* (or press **<Alt>-<F11>**), then select *Insert•Module* and enter the macro.

To run the macro, first activate the worksheet that you want to clean up. Then choose *Tools•Macro* (in Excel 97 the command is *Tools•Macro•Macros*), and select *DeleteEmptyRows* from the Macro dialog box. The empty rows will vanish before your eyes. You'll want to save your workbook before executing the macro, because the operation cannot be undone. I included a command that turns off screen updating for faster performance.

FIX MESSED-UP MENUS IN EXCEL 97

I RECENTLY UPGRADED to Excel 97. I customized a few of the toolbars, and my Data menu disappeared. Restarting Excel doesn't fix it. Help!

Marisa VanWinkle, San Diego

DON'T FRET. Select *View•Toolbars•Customize*, and then click the *Toolbars* tab in the Customize dialog box. Select *Worksheet Menu Bar* and click the *Reset* button (see **FIGURE 2**). The menu bar will be restored to its original state. Excel 97's menu bar is actually a toolbar in disguise, and it's easy to delete a menu accidentally while you're customizing other toolbars. So be careful out there.

SUPPRESSING 1-2-3'S SPLASH SCREEN

MOST WINDOWS programs display a graphics logo or splash screen at start-up. If you're a 1-2-3 user, you can bypass Lotus's splash screen by adding a switch to the command line used to start 1-2-3. These switches (shown below) differ for each version of the spreadsheet program.

The procedure for modifying the command line varies with the version of Windows you have. If you use Win 95, find the Shortcut that loads 1-2-3. This may be a desktop icon or an entry in your Windows\Start Menu\Programs\Lotus SmartSuite folder. Right-click the Shortcut and select *Properties*. In the Properties dialog box, click the *Shortcut* tab, and modify the Target field by adding the correct switch.

If you're using Windows 3.*x*, select the 1-2-3 icon in Program Manager and press **<Alt>-<Enter>** to display the Program Item Properties dialog box. Then modify the Command Line field by appending the appropriate switch.

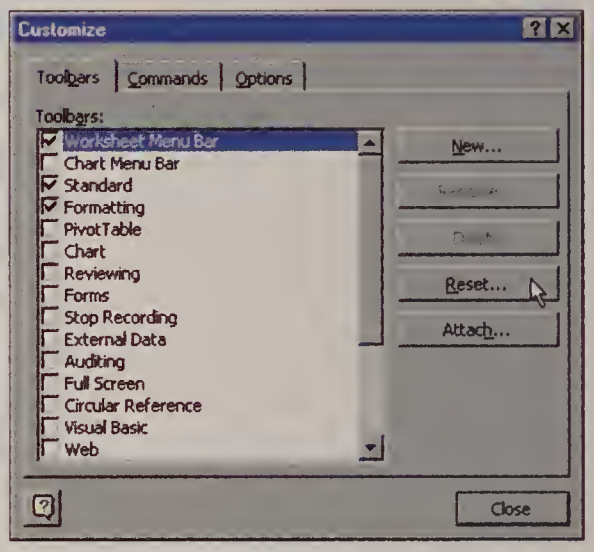

FIGURE 2: RESET EXCEL 97 menus and toolbars in the Customize dialog box.

VERSION	SWITCH	EXAMPLE COMMAND LINE
1-2-3 97	/len /s	c:\lotus97\123\123w.exe /len /s
1-2-3 release 5.0	l	c:\lotsuite\123r5w\programs\123w.exe l

IT'S A NEW SPREADSHEET GUY!

WELCOME TO MY first Spreadsheets column for *PC World*. Former columnist Richard Scoville has moved on, and I'm delighted to take over his duties. I've been involved with spreadsheets since VisiCalc and spend most of my time either developing spreadsheets or writing about them. In future months, I'll share my tips and techniques and answer as many of your questions as I can. The next time you're on the Web, check out my site, The Spreadsheet Page, at www.j-walk.com/ss/.

Spreadsheets *welcomes your questions and tips and pays $50 for published items. Contributing Editor John Walkenbach has written nearly two dozen spreadsheet books. See page 14 for contact information.* ■

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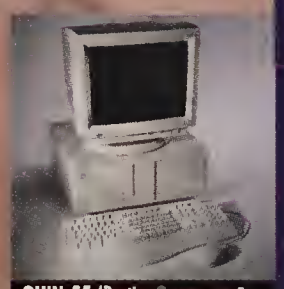

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Reorder numbered paragraphs ◆ Change default bullets ◆ Create an index

Make Word 97 Easier on Your Eyes

DOES WORD'S WHITE background hurt your eyes? A new feature in Word 97 lets you change the background color of your editing screen to any shade under the sun. It's simple to do but not obvious to most users. Here's how to use this feature:

1. Select *File•Open*, then load **normal.dot** as you would any document. It's usually in the MSOffice/Templates directory.
2. Select *Format•Background* and select the color of your choice (see **FIGURE 1**).
3. Select *File•Save*, then *File•Close*.

All new documents you create in Word will appear with the background color you selected. These background colors appear only on screen; they do not print.

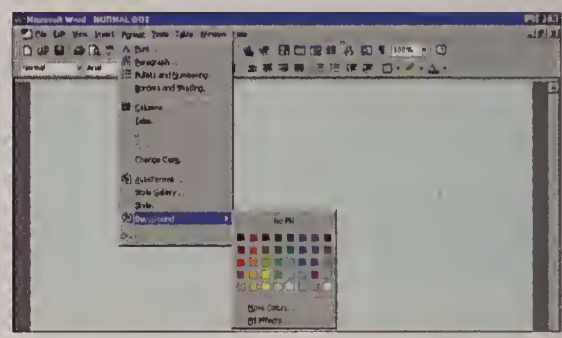


FIGURE 1: CHANGE WORD 97'S BACKGROUND color by modifying the normal.dot template.

CLEAN UP E-MAIL TEXT IN WORD

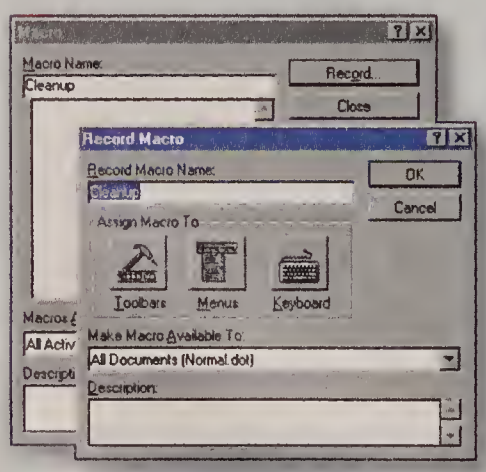
E-MAIL MESSAGES and other ASCII files often include hard returns at the end of each line. When you open such text documents in Word, or cut and paste from your e-mail program, the text has strange line breaks and odd paragraph formatting. While Word has no built-in tool to fix these awkward documents, there is an easy solution that works in all versions of Word. If you handle many such documents, you'll want to record the steps as a macro so you won't have to repeat them (see also **STEP BY STEP**).

1. Open the document you want to reformat, then start recording your macro: Select *Tools•Macro*, type a name for your macro, such as **Cleanup**, click *Record*, and in the Record Macro dialog box, click *OK*.
2. Select *Edit•Replace*, type **^p** (a caret and a *p*) in the Find What box, and type ~ (a tilde) in the Replace With box. Click *Replace All* to replace all hard returns with tildes. Click *OK* at the prompt. The document will look strange, but don't worry about it.
3. While the Replace dialog box is still on screen, type ~~ in the Find What box, and type **^p** in the Replace With box. Click *Replace All* to replace all double hard returns (the normal break between paragraphs in text files) with a single hard return. Click *OK* at the prompt.
4. Type ~ in the Find What box, and type a single space in the Replace With box. Click *Replace All* to replace what was the single hard return at the end of a line with a space character to separate words. Click *OK* at the prompt, then click *Close*.
5. Click the *Macro Stop* button to turn off macro recording. You may still have to do some minor editing ▶

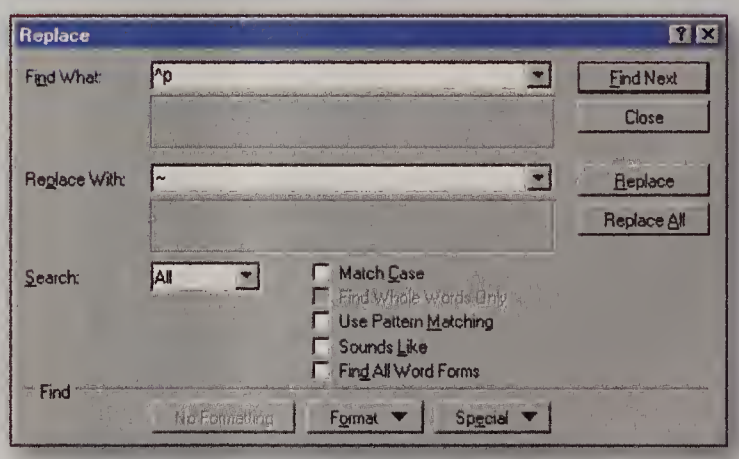
STEP BY STEP

Reformat Imported E-Mail and ASCII Text With a Simple Word Macro

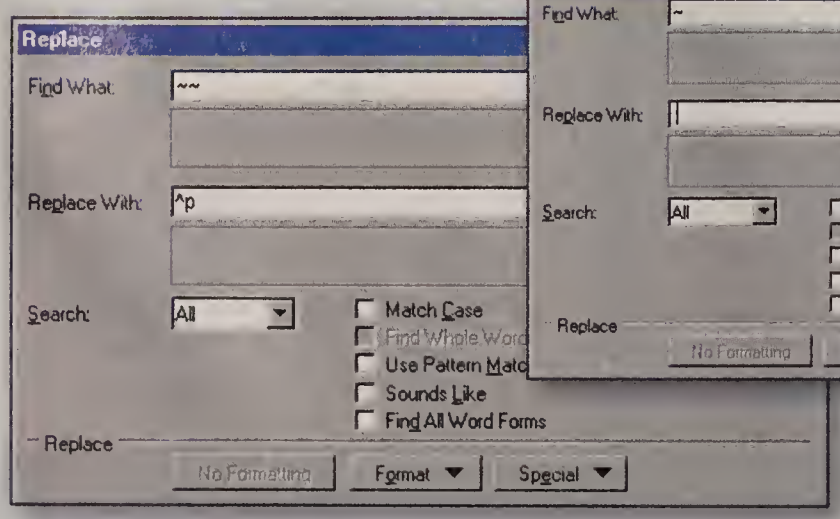
❶ Start recording the Cleanup macro.



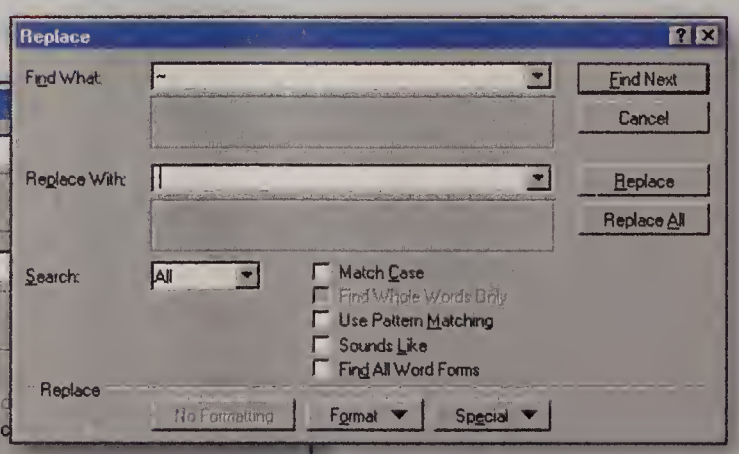
❷ Replace all end-of-line hard returns with tildes.



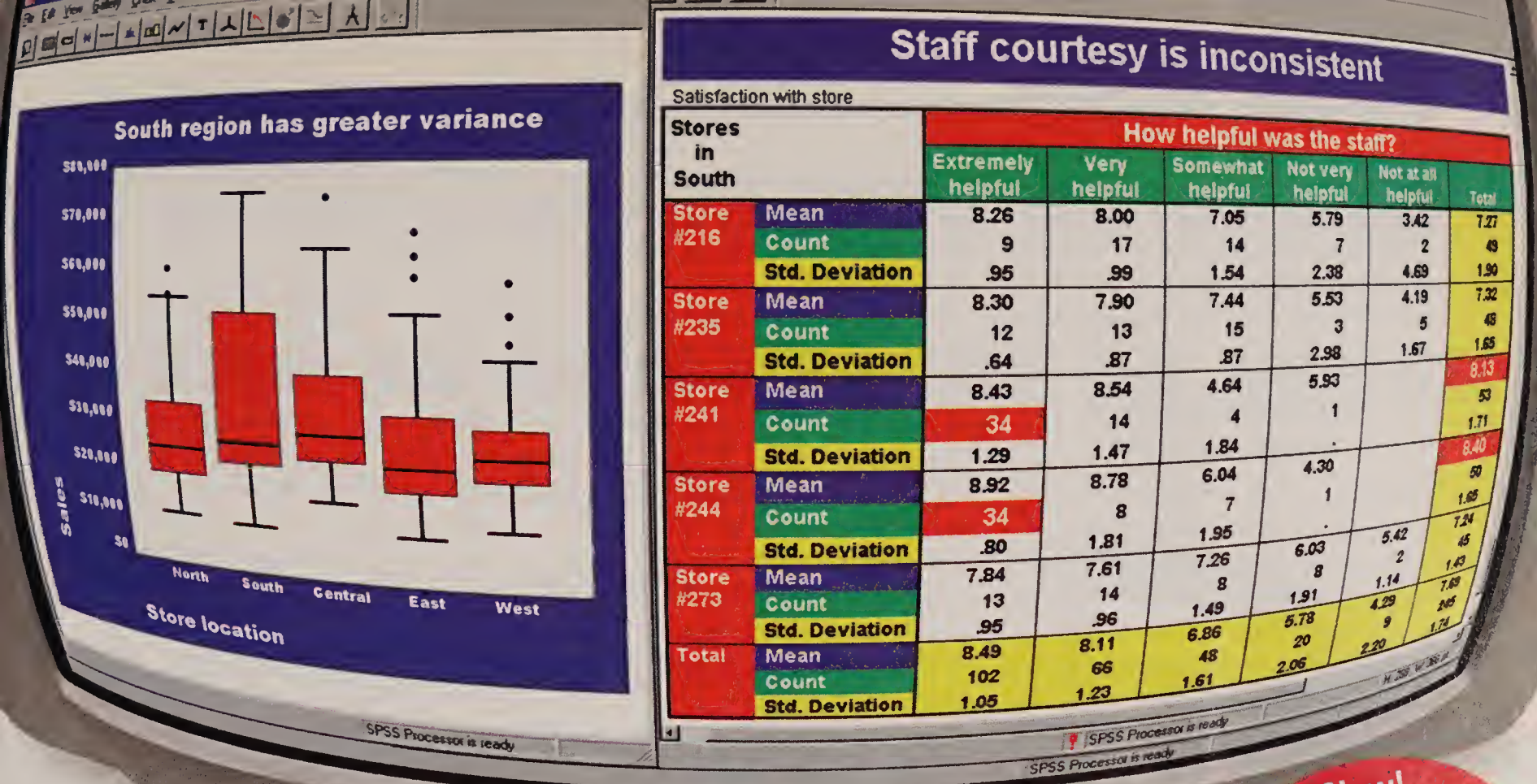
❸ Replace all double hard returns (the normal break between paragraphs in text files) with a single hard return.



❹ Replace the tildes from step 2 with spaces.



◀ ❺ Turn macro recording off.



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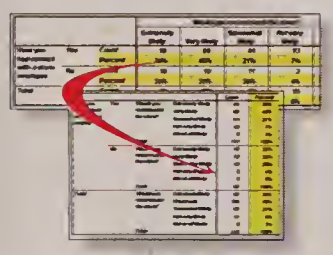

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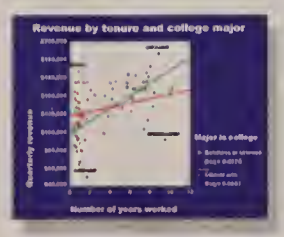

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manually to finish cleaning up the document, but most of your work will be done.

The next time you need to clean up e-mail or ASCII text in Word, select *Tools•Macro•Macros,* select the *Cleanup* macro, and click *Run.*

REORDER MANUALLY NUMBERED ITEMS

WHEN YOU INSERT or delete an item in a numbered list, Word automatically puts the list in the correct order and renumbers the remaining items—that is, if you created the list using the Numbering icon or while the Automatic Numbered Lists feature was turned on. If you typed the numbers in manually, or if you open a document created with another program, it can be a real chore to edit the numbers when you move or delete paragraphs or insert new ones.

But as long as each numbered item is a single paragraph, there's an easy two-step way to accomplish this seemingly tough job. This technique won't renumber the paragraphs, but it will reorganize them in the correct order based on the numbers that are there.

1. Highlight the entire list.
2. Select *Table•Sort Text* (select *Table•Sort* in Word 97), then click *OK* in the Sort Text dialog box without altering any of the settings in the dialog box.

SPLIT THE SCREEN TO WORK ON TWO PARTS OF A DOCUMENT

THERE ARE TIMES when it's useful to see two parts of the same document simultaneously—when you're working on the introduction and the conclusion, for example. The split screen feature in both Word and Word Pro allows you to do just that. (Current versions of WordPerfect don't include this feature.) With a split screen, cutting text from page 1 and pasting it to page 10, for example, is easy when both pages appear on screen at the same time. Here's how to split up your work in Word and Word Pro:

Word 6.0, 7.0, and 97: Open the document and select *Window•Split.* Drag the gray dividing line to the point on the editing window where you want the screen divided, then click to split the screen. You can scroll through the document in either of the new windows, and drag selected text or other objects between the windows. To remove the split screen, select *Window•Remove Split.*

Word Pro 96 and 97: Open the document and select *View•Split Top-Bottom.* Word Pro will divide the screen into equal-size windows. You can scroll through either editing window independently, and drag text or other objects between the windows. When you're finished working in this mode, select *View•Clear All Splits* to restore the single window.

MARKING WORD PRO INDEX ENTRIES

IF YOU'RE WORKING on a long document that will eventually have an index, it makes sense to mark text for top-level index entries as you go, rather than wait until after the entire document has been written. Fortunately, that's easy to do in Word Pro 96 and 97.

When you start working on the document, select *Text•Mark Text as•Index Entry* before beginning to type or when you type

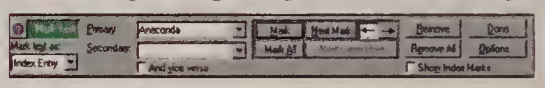

FIGURE 3: TO CREATE AN INDEX in Word Pro, type the word you want as an entry.

the first item to be indexed. This displays the Mark Text toolbar shown in **FIGURE 3**.

Each time you type a word or phrase you want to have in the index, or after typing a paragraph or two, highlight the desired text. It will appear automatically in the Primary field of the toolbar. Just click *Mark* on the toolbar to make the text a top-level index entry. Click back in the document to continue writing or editing.

You can use the Mark Text toolbar for secondary index entries as well, but it's usually best to create all your top-level entries first, since Word Pro keeps a list of them in the toolbar.

Find additional tips at www.pcworld.com/hereshow. Word Processing *welcomes your questions and tips and pays $50 for published items. Contributing Editor George Campbell is a contributor to* The PC Bible *(Peachpit Press, 1995, 800/283-9444). See page 14 for contact information.* ■

Replace Standard Bullets With Symbols in WordPerfect

THERE ARE MANY interesting characters I'd like to use in bulleted lists instead of the default bullets that WordPerfect offers. Is there any way to replace these default characters?

Steve Colburn, Largo, Florida

IT'S EASY TO replace the default bullet characters in WordPerfect 6 and 7. Here's how:

1. In a blank document, select *Insert•Bullets & Numbers.* In the Bullets & Numbers dialog box, select the entry you want to change in the Styles list, and click *Edit* (see **FIGURE 2**).
2. In the Styles Editor dialog box, press <Delete> to remove the current character code.
3. Press <Ctrl>-w to open the WordPerfect Characters dialog box, select the character that you want to use as a bullet, and then click the *Insert and Close* button.
4. Back in the Styles Editor dialog box, click on the new character in the Contents box, to the left of the blinking red rectangle, to convert the character to a WordPerfect character code and reposition it.
5. Click *OK* twice to finish the job. Your new character becomes the new WordPerfect default for that bullet type.

You'll have to remember which characters correspond to the standard bullet entries, since you can't rename the entries in the dialog box.

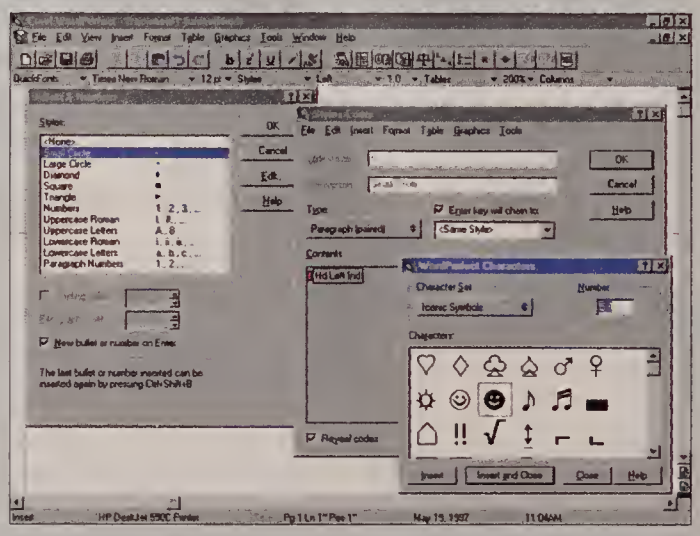

FIGURE 2: BULLETS DON'T HAVE TO BE BORING. Change WordPerfect's default bullets to hearts or smiley faces.

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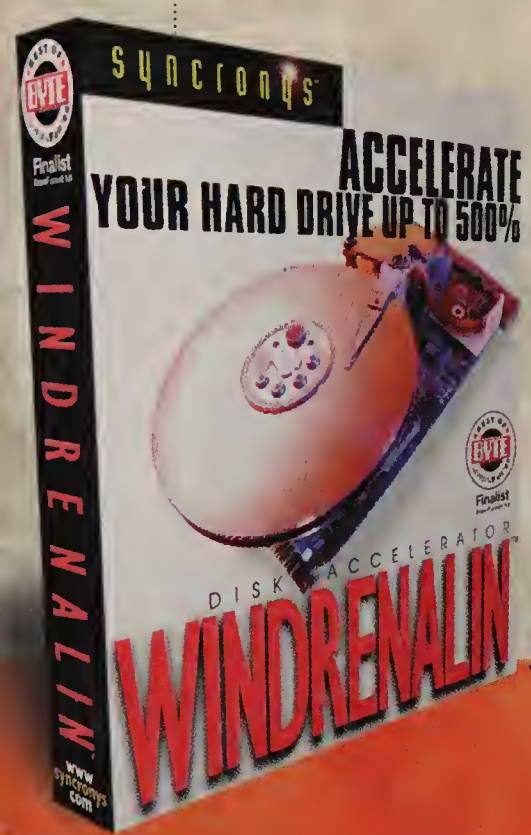
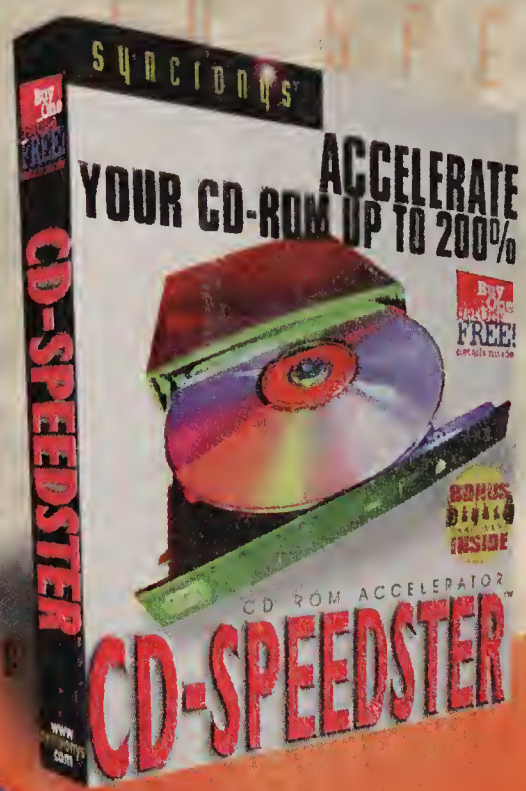


We asked PCTest and NSTL to check it out. Here's what they had to say...



T R U E S P E E D

THE RESULTS

Good Launch times? PCTest concluded: "Overall improvements range from 33% to 184% ... With the multi-tasking running, an overall improvement of 450% to 3,600% was experienced."†

NSTL reported: "Windrenalin showed a marked improvement in application launch times. The improvement is dramatic when running four file comparisons in the background."††

*Multiple searches on Compton's Interactive Encyclopedia™ installed in minimum mode conducted under Windows 95 on a Pentium 133 with 16MB RAM, 8X CD player and 100MB CD-ROM cache. Actual results may vary based upon individual systems and applications.

† PCTest–Windrenalin HD Acceleration Final Report, 1/31/97, pg. 2 (General Conclusions and Observations). Actual results may vary based on your system, applications and nature of multi-tasking.

†† NSTL Final Windrenalin HD Report 2/97, pg. 3. NSTL makes no recommendation or endorsement of any product. Actual results may vary based on your system, applications and nature of multi-tasking.

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Circle 232 on reader service card

Monitor your Internet connection ◆ Don't accept cookies from strangers

A Survival Guide for Microsoft E-Mail Packages

MICROSOFT HAS BEEN churning out e-mail programs as prolifically as Stephen King turns out horror stories—and some users have found them just as scary. There's Exchange, Outlook 97, Outlook Express, Internet Mail and News, and a new Outlook Web Access. Because each bears the magic Microsoft logo, users eagerly buy or download them, certain they're getting something good—and sometimes they are. But one morning they wake up and realize they have four Microsoft e-mail programs on their system—and are using Eudora Light instead.

Here's a guide to the Microsoft e-mail programs, when to use them, when to nuke them, and what to do if they act up.

HOW TO TELL THEM APART

Exchange. This is the "universal in-box" that comes with Windows 95; it's also known as Windows Messaging. To find it, click the *Inbox* icon. Exchange is a rudimentary e-mail program whose sole advantage over other Microsoft e-mail programs is that you can rig it to download messages from a variety of sources, including CompuServe, Microsoft Network, and your Internet service provider. You can also use it to send faxes—a procedure not for the timid. But Exchange is clunky. If you have only one online service or ISP, you're better off using that service's software or an e-mail program such as Eudora Light. Microsoft is dropping Exchange; the default e-mail package in Windows 98 will be Outlook Express.

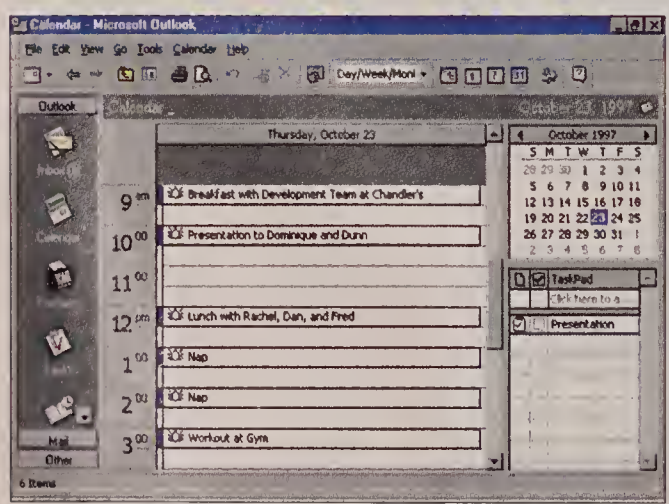

FIGURE 1: OUTLOOK 97 combines e-mail with a PIM, but it has problems with stability and compatibility.

Outlook 97. Microsoft's most powerful e-mail client integrates e-mail with personal information management and groupware features (see **FIGURE 1**). It offers calendars, journals, and schedules; a battalion of contact management tools; and the ability to create personal folders and subfolders galore. If your office runs Exchange Server (Microsoft's proprietary messaging platform), employees can use Outlook 97 to share contacts and calendars. You can automate e-mail retrieval, tag messages with notes about follow-up action, and drag and drop Microsoft Office files into e-mail messages.

But the original shipping version of Outlook 97 was famously buggy, particularly with Internet mail servers—it was designed primarily for Exchange Server. As this goes to press, Outlook 97 continues to suffer from problems such as e-mail messages getting stuck in the Outbox, program and system crashes, and other glitches. It has also had difficulties supporting multiple POP3 accounts. Microsoft has posted patches on its Web site (www.microsoft.com/kb/articles/q166/0/22.html) and in August was planning to release an upgraded Outlook 8.02 that would solve all of these problems, as part of Microsoft Office 97 Service Release 1.

If you love Outlook's other features and are willing to spend a few hours troubleshooting (see "Where to Get Help," next column), then by all means continue to use this program. Otherwise, try simpler and more robust e-mail products such as Pegasus (www.pegasus.usa.com) or Eudora (www.eudora.com).

Outlook Express. This e-mail program will be built into Internet Explorer 4.0 and Windows 98. Outlook Express is the successor to Internet Mail and News, which is found in earlier versions of Microsoft's Internet Explorer. Outlook Express (see **FIGURE 2**) supports HTML-formatted mail and offers a few nifty features such as the ability to integrate e-mail with Usenet news and the ability to search big Internet "white pages." It can filter e-mail (useful for automatically deleting spam), and gather messages from multiple ISPs.

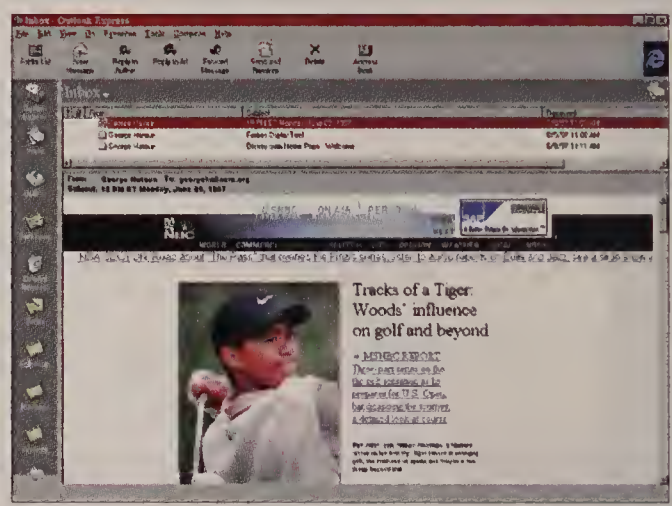

FIGURE 2: OUTLOOK EXPRESS is a free Internet e-mail client that will look much like Outlook 97.

But the early beta versions of Outlook Express were clumsy to use and full of bugs; for example, they disabled the Mail button in Internet Explorer. Microsoft says it will fix the bugs and offer a revamped user interface, much closer to that of Outlook 97, by the time the package formally debuts along with Internet Explorer 4.0. If the program works for you, great. But before you settle on it you may want to test-drive Eudora Light or Pegasus—I find them both friendlier.

Outlook Web Access. This is a new Web browser e-mail client, but it works only with Microsoft's Exchange Server.

WHERE TO GET HELP

YOU'LL FIND A variety of helpful troubleshooting tutorials on Microsoft's Web site (www.microsoft.com). Click *Search* ▶

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September 9, 1997
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Circle 85 on reader service card

Troubleshooting Microsoft Mail

Problem: Your program can't find the out-box or the in-box.

Solution: All four Microsoft e-mail programs store your messages in a Personal Folder (in .pst files) and your addresses in a Personal Address Book (in a .pab file). Depending on how and when you installed your first e-mail client, these files can end up in different places; you may need to tell any e-mail programs you install later where to find them.

Problem: Your e-mail messages are getting stuck in Outlook 97's Outbox.

Solution: This problem can be caused by a damaged Personal Folder (.pst) file. Run an Inbox Repair Tool to fix it.

Problem: Outlook doesn't start.

Solution: The Personal Folder file or the mapi32.dll and msvcrt40.dll files may have been damaged. These files are sometimes overwritten when other Windows applications are installed (CorelDraw 7 is one program that does this). To get everything working again, you'll have to reinstate the e-mail program's version of these files.

and type in the name of the e-mail program you're using.

The first step in fixing Outlook 97's problems is to install the Internet Mail Enhancement Patch; for details see www.microsoft.com/outlook/documents/imep.htm. Technical support newsgroups for Outlook 97 can be found on the Web at www.microsoft.com/Support/Products/Office/Outlook/.

Sue Mosher's Slipstick Systems Outlook Page (www.slipstick.com/exchange/outlook.htm) is the premier source of Outlook 97 advice. It offers directions on how to import the contents of mailboxes and address books from non-Microsoft e-mail programs and export Outlook 97 contents to other programs. Mosher's page also provides recommendations on mail add-ons.

TRACK YOUR INTERNET CONNECTION'S VITAL SIGNS

IF YOU SUSPECT your Internet connections aren't what they should be, download VitalSigns' Net.Medic (www.vitalsigns.com). This shareware monitors your modem speed, your connection throughput, and your ISP's efficiency, and it keeps you abreast of traffic conditions on the Web (see **FIGURE 3**). Net.Medic also alerts you when your browser is hogging memory, and it creates efficiency reports on your ISP that tell you how good your connections are and how many errors occur. Registration is $49.95 for an individual user, or $450 for ten users.

ARE YOUR GRAPHICS FUZZY?

IF YOU'RE SEEING fuzzy or weirdly colored graphics on the Web, your browser is probably out of date. To download the latest version of Netscape Communicator, head to Netscape's page (home.netscape.com/flash1/download/). To download the latest Internet Explorer, go to Microsoft's page (www. microsoft.com/ie/).

THIS MONTH'S INTERNET SECURITY TIP: SMASH COOKIES WITH COOKIE CRUSHER

DO YOU KNOW of an Internet Explorer plug-in that prevents Web sites from sending cookies? I'm getting tired of clicking *No* all the time.

Richard Rogers
Durham, North Carolina

FIGURE 3: NET.MEDIC WILL keep you abreast of traffic speeds in cyberspace.

COOKIE CRUSHER IS a $10 shareware utility that works with both the Microsoft Internet Explorer and Netscape Navigator browsers.

Cookies are bits of code that a Web site sends your browser to track which pages you access (helping you to place merchandise orders online, for example). The cookies remain indefinitely on your hard disk, and some people consider them a violation of privacy.

To use Cookie Crusher, you just start it up, and it loads your browser. Cookie Crusher works with Windows 95 or Windows NT. Download it from The Limit Software (www.thelimitsoft.com), or from PC World Online.

Enhancing Your Outlook

BOTH INDEPENDENT Outlook 97 enthusiasts and Microsoft regularly post enhancements and bug fixes for Outlook 97. Here are a few from Microsoft's Web page (www.microsoft.com/outlook/) and other sites.

Microsoft Mail Security Attachment Add-On. This utility alerts you whenever someone sends you an executable file that should be scanned for viruses. It's available free from Microsoft (www.microsoft.com/security/mailaddon.htm).

Rules Wizard. This free Microsoft utility lets you create rules for e-mail handling in Outlook 97. You can tell the e-mail program to inform you when messages arrive from certain addresses, automatically forward those messages to specified folders, or flag them. Head to Microsoft's Web site, click *Search*, and then type **rules wizard.**

WabOut. This free utility will make your Windows address book into an Outlook one (97 or Express). It's available at www.empire.net/~level/WabOut.html.

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The limitations of host-based modems ◆ Phasing out obsolete ISA cards

Troubleshoot Laser Printers

LASER PRINTERS CAN be finicky beasts. And if you don't have a computer professional at your beck and call, someday your printer will mess up and leave you stranded. Here's a guide to handling many common laser printer crises.

GET SOME HELP

AS MURPHY WOULD tell us, your printer will probably go haywire just when you're creating a critical document, one that you need *right now*. When that day comes, you can call on two Windows 95 tools.

First try the Printer Troubleshooter. To launch it, select *Start•Help*, click the *Index* tab, type **tro** in the first edit box, and then double-click *printing problems* in the list that appears. Alternatively, you could go to your printer's Properties screen (open the Printers folder by selecting *Start•Settings•Printers*, right-click the printer's icon, and select *Properties*) and click *Print Test Page*. If there's a problem printing the page, Windows 95 will ask whether you want to launch the Print Troubleshooter.

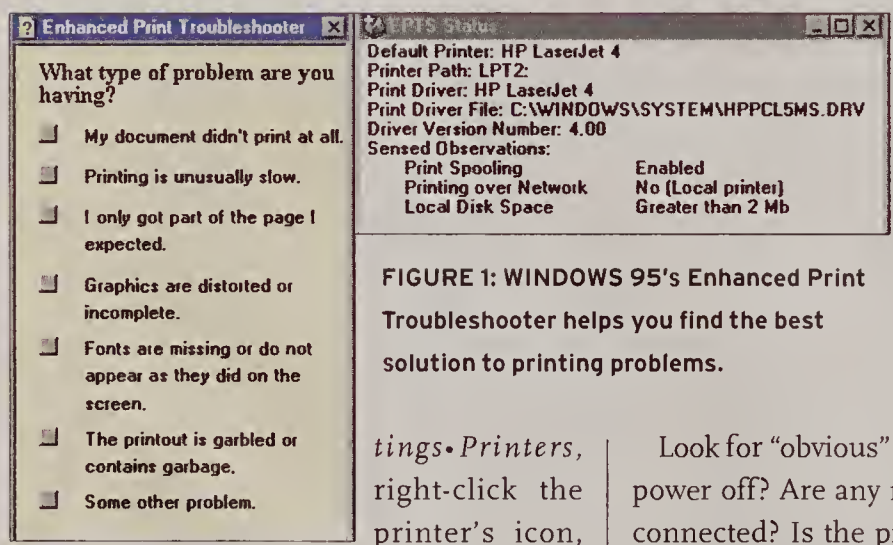

FIGURE 1: WINDOWS 95's Enhanced Print Troubleshooter helps you find the best solution to printing problems.

If that utility doesn't help, try Microsoft's more sophisticated Enhanced Print Troubleshooter, which is located on the Windows 95 CD-ROM in the \Other\Misc\EPTS folder (see **FIGURE 1**). Double-click *epts.exe* or run the program from the command line.

Both utilities cover most Windows 95 setup issues such as spooling settings, available memory, and driver versions. You can also check the printer manufacturer's Web site for a FAQ page or knowledge base. Hewlett-Packard, for example, offers a useful FAQ for laser printers (www.hp.com/cpso-support/laserjet/faq).

CHECK THE BASICS

THE FIRST STEP is to make sure your printer is communicating with the computer. Typically, a button on the printer's control panel toggles it online and offline. After you've confirmed that the printer is online, turn the printer off and on and try printing again. Many printer errors occur apparently at random.

Next, print a test page from your printer—check your manual for instructions. A problem here means that the trouble lies with your printer, not with its cable or software or network connection.

You can also print a test page directly from Windows 95. Go to your printer's Properties dialog box and click the *Print Test Page* button. If the printout appears to be correct, you know you have a suitable driver installed.

Look for "obvious" problems, too: Is the power off? Are any necessary cables disconnected? Is the printer's active paper tray stocked with paper? Does your document specify an odd paper size?

INSIDE THE ROLLER DERBY

IF THESE STEPS don't do the trick, you may well have a paper jam, which means you'll have to open up the printer.

Most moving parts in a laser printer are *rollers* that guide the paper from its tray (or other starting point) through the printing process and out of the printer (see **FIGURE 2**, on page 354). As the paper travels through the printer, it passes under a rotating cylinder called the *photoreceptor*, where it picks up toner—which is the laser printer's equivalent of ink. The paper then moves through the *fuser assembly*, a set of high-temperature rollers that permanently bond the toner to the paper.

Most small and midsize laser printers integrate the photoreceptor into the toner cartridge. As the photoreceptor rotates in the cartridge, it moves past the *charger corona wire*, which places a uniform electrical charge on the photoreceptor's surface. Then a laser beam "writes" an oppositely charged electrical image onto the surface of the photoreceptor. Next, the photoreceptor rotates through the toner reservoir, where toner attaches to the image. Finally, the toner is pulled from the photoreceptor to the paper by an electrical charge placed on the paper by the *transfer corona wire*.

Okay, so much for laser printer mechanics. If you think you're dealing with a paper jam, read your printer's manual for hints on finding the jam. But be careful: There are high voltages in the corona wires, and the fuser assembly can be very hot (see Figure 2 again). Always turn the printer off and, if possible, wait 10 minutes for it to cool down.

When removing the errant sheet of paper, pull gently to avoid tearing it, and try to pull in the normal direction of paper movement. Make sure you remove all bits of paper; check the extracted sheet for tears or missing corners.

Also beware of unfused toner on the paper. Not only is it messy, but stray particles in your printer can cause further trouble. And if you're getting paper jams consistently, examine the rollers nearest the jam; they're often the culprits. You may be able to realign them.

If your paper won't feed correctly when you print, remove all the paper from the tray, gently fan the leading edges with your thumb, and try printing again. Paper tends to curl naturally; unless your manual says otherwise, turn the paper so that it curls under. And make sure the paper is properly inserted in the tray. Check the spring mechanisms that position the paper, which sometimes may need to be tweaked or realigned. ▶

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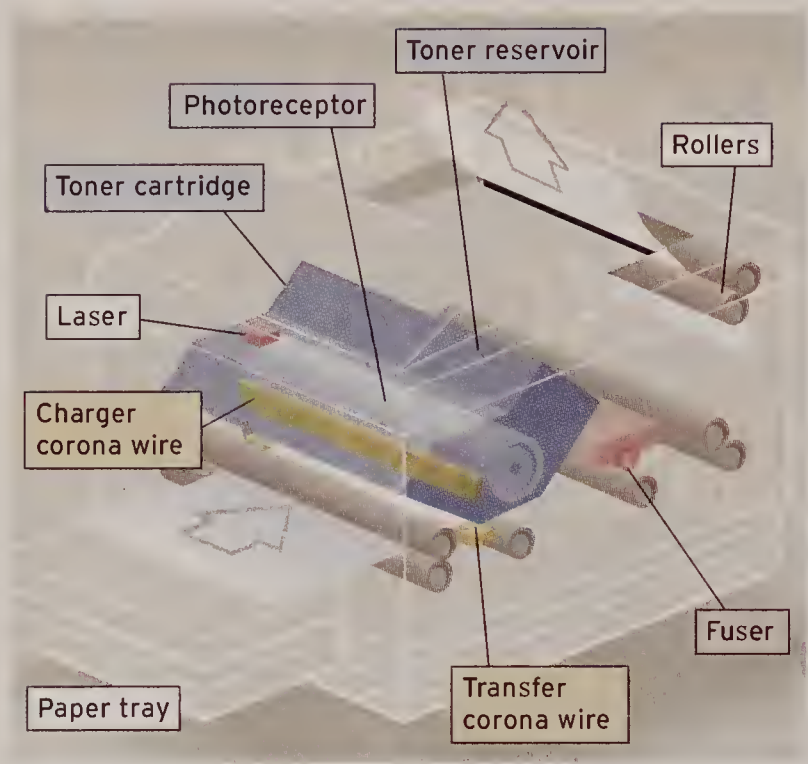


FIGURE 2: HERE'S WHAT'S UNDER THE HOOD of your laser printer. Be careful when you open it up—the corona wires contain high voltages, and the fuser assembly may be hot.

LOOKS ARE IMPORTANT

SO YOU'RE NOT GETTING what you want from your printer? Here's a guide to some common problems.

Scrambled or fragmented images. If the output you're getting is fragmented, in the wrong typefaces, or just plain gibberish, your printer is having trouble processing the image. Check the printer cable connections and try swapping in another cable to eliminate that as the source of trouble. Also check your printer properties to make sure the right driver is installed. Sometimes a driver can become corrupted; you can try reinstalling it with the Add Printer Wizard (click the *Add Printer* icon in the Printers folder). And make sure your parallel port is configured properly; try setting the port to the standard setting in the system setup program.

Uneven print density across the page. The most likely cause is a low toner level. To redistribute the toner more evenly, remove the toner cartridge, holding one end in each hand, and tilt it back and forth. Also make sure the printer itself is level and not near any powerful lights.

Bands of uneven print density running down the page. See your manual for instructions on cleaning the photoreceptor's electrical contacts. If that doesn't help, replace the photoreceptor (which often means replacing the toner cartridge).

Light or gray print everywhere. As a photoreceptor wears out, it doesn't attract enough toner. You can often correct this in the short term by increasing the print density setting on the printer's external control panel or inside the unit itself.

Dark background or echoed images. Decrease the print density.

White patches or vertical white lines. The transfer corona wire may be dirty. Open your printer and look for the wire. If you can reach it, *gently* clean the wire with a cotton swab and alcohol.

All-white pages. The transfer corona wire may be broken. If it is, take the printer in for service.

All-black pages. The charger corona wire (which is probably located in the toner cartridge) isn't working correctly. Remove and replace the toner cartridge to clear the electrical contacts. If that doesn't work, replace the cartridge.

Spots. Spots that repeat in a similar pattern indicate either a damaged photoreceptor, which may call for a new toner cartridge, or a dirty fuser assembly. Call a service technician.

Toner flaking off the page. The fuser is malfunctioning. Call that technician.

Blurry images. Some paper doesn't take well to toner. Blurring also may be caused by moist paper. Try using fresh, dry paper.

SOMEDAY MY PRINTS WILL STOP

NOT ALL PROBLEMS are worth fixing. Eventually, your printer's gears and motors will wear out, and you'll be better off buying a new printer. Expect to get between 20,000 and 40,000 pages from a low-end personal laser printer and more than 100,000 pages from a higher-quality model. Most office lasers should provide at least 300,000 pages. (Check your manual for exact numbers.) Also look for a built-in page counter. Hewlett-Packard's 4P, 5P, and 6P (but not L) series printers, for example, have a counter available through their self-test function.

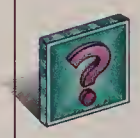
WHEN MODEMS DON'T KNOW DOS

MY FRIEND HAS an internal 33.6-kbps Plug and Play modem that works under Win 95, but it won't work with DOS or even in a DOS window. He wants to use it for playing DOS games. I checked its settings, and none conflict with anything else. Do you have any ideas?

Neil Mortensen, Milford, New Jersey

YOUR FRIEND PROBABLY has a host-based modem such as a Winmodem from U.S. Robotics (now 3Com). Host-based modems depend on software and the computer's CPU to perform many data manipulations that would normally be handled by chips on the modem itself. This makes for a less expensive modem and much easier, software-based upgrades. The downside, of course, is that the modem puts an additional load on the CPU. And, at least in the case of the Winmodem, it requires Windows' multitasking abilities and won't work with DOS.

CAN I STICK WITH MY OLD JOYSTICK?



I'VE READ RECENTLY about manufacturers' plans to eventually abandon the ISA slot. This leaves me wondering about my old 8-bit two-port joystick card. Is it a dinosaur?

Rich Morey, Internet

IT'S BECOMING one. Look for ISA-less motherboards to start appearing early in 1998; prices should fall in the second half of the year as the new motherboards become available in volume.

Even then, you should still be able to use your joystick with the new motherboards, assuming it uses a standard game port. Motherboard manufacturers are seriously concerned with backward compatibility because of the millions of installed peripherals that use the ISA bus.

Hardware Tips *welcomes your questions and pays $50 for published items. Kirk Steers is a* PC World *contributing editor.* *See page 14 for contact information.* ■

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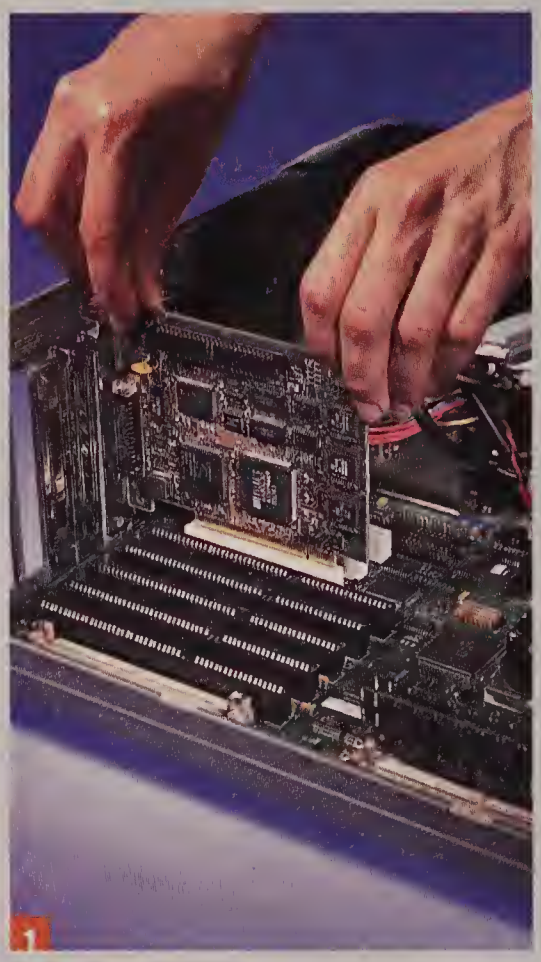
Install a CD-Recordable Drive

GOT A MOUNTAIN OF DATA and no good way to move it? Check out CD-Recordable drives. They can write up to 650MB of data onto a CD-R disc, are fairly inexpensive and friendly, and aren't much harder to install than standard SCSI CD-ROM drives.

CD-Rs give you an economical way to create backups, store large files such as graphics and databases, and distribute software. If your PC has a sound card and audio editing software, you can also create audio discs that hold up to 74 minutes of music and run on any CD player. If that's not fancy enough, you can build mixed-media discs with data, music, and even video.

You can buy double-speed CD-R drives in the $400-to-$600



Install the SCSI card. If your PC already has a SCSI card installed, make sure it's a high-performance card. (ISA cards may not be quick enough to write CD-Rs.)

If your CD-R drive came with a SCSI card, read the installation instructions.

If you don't have a SCSI card, you'll need to buy one. Since inexpensive ISA SCSI cards lack the performance you need for CD-R recording, buy a PCI bus-master card instead. For example, Adaptec (www.adaptec.com) offers the $129 AHA 2910 PCI connection kit specifically to match CD-R drives.

Remove the cover from your PC, find a free PCI slot, remove the slot cover behind it, and carefully plug in the SCSI card. Screw it down firmly. Don't put the cover back on yet.

If you're installing an external CD-R drive, skip to step 3.

Install an internal CD-R drive. SCSI drives need a unique SCSI ID number between 0 and 7, usually set with jumpers (top left) on an internal drive and with a switch on an external drive. The SCSI card also needs a unique SCSI ID number. SCSI cards usually use ID 7. If the CD-R drive is the only SCSI peripheral, you can probably use the default ID for that drive (usually ID 5). If you're connecting the drive to a cable that's already attached to another SCSI device, make sure there isn't an ID conflict. Refer to your manual, and change IDs as needed.

If the CD-R drive is the last SCSI device on the cable, it must be terminated, usually with a jumper or a plug-in resistor pack. Most drives are terminated at the factory.

You'll need a free 5¼-inch drive bay with front-panel access. Remove the front panel where the CD-R drive will go. Some cases require that you mount rails (top right) to the side of the drive, others don't. If your system doesn't have extra rails, order them from your dealer or from the PC manufacturer. Mount the drive using screws that are normally included with CD-R kits.

Connect a SCSI ribbon cable between the CD-R drive and the internal connector on the SCSI card, making sure to align pin 1 on the cable (indicated by a red line running along the cable's edge) with pin 1 on both the CD-R drive and the SCSI card. If you're connecting the drive to an existing SCSI setup, the ribbon cable should have an extra connector you can use. If not, buy a new SCSI cable.

Plug in a free power connector to the CD-R drive. If needed, purchase a Y-connector that makes two connectors out of one.

PHOTOGRAPHS: KEVIN CANDLAND

range from companies such as Olympus (www.olympus.com), Philips (www.pps.philips.com), Plextor (www.plextor.com), and Sony (www.sony.com/storagebysony/). Blank discs have dropped in price and now cost $6 to $8, less if you buy in bulk.

Today's CD-R drives have licked the compatibility problems that plagued earlier models, so you can be confident the discs you create will play on virtually any CD-ROM drive. And just about any contemporary hard drive is fast enough for recording.

All CD-R drives are SCSI because SCSI provides the performance needed to "burn" a disc, and they all do double duty as CD-ROM readers. Most CD-R drives are rated as only 4X or 6X for reading, but because a SCSI CD-ROM drive doesn't load your computer's processor as much as an EIDE drive does, performance can be better than those numbers indicate.

You'll need a Pentium PC, the faster the better. You can create CD-Rs with a Pentium-90, but you may get bad writes, so a Pentium-133 is a more reasonable minimum. You'll also need a SCSI card, of course. Some CD-R drive kits come with SCSI cards; others don't. And if you're installing an internal drive, read step 2 carefully before you start, to make sure you've got what you need.

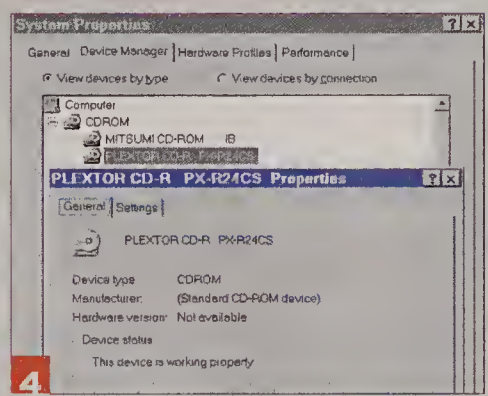
Stan Miastkowski is a PC World *contributing editor.* ■

Install an external CD-R drive. External CD-R drives are easier to install than internal units.

Like any other SCSI device, the CD-R drive needs a unique ID number, which is usually set with a switch on the rear of the external drive (a dial switch is shown, bottom left).

If the CD-R drive is your only external SCSI device, it also must be terminated. Some external CD-R drives have termination switches. Others require you to insert a termination plug (bottom right) included with the drive into one of the two connectors on the rear of the drive case.

Using the cable that comes with the drive, plug the large end into one of the connectors on the rear of the CD-R drive (top). It doesn't matter which connector you use. Plug the other end of the cable into the connector on the rear of the SCSI card. Attach the AC cable to the external drive.



Install the drivers. Turn on your PC. (If you're using an external CD-R drive, turn it on first). If you've installed a new SCSI card, Windows 95 should detect the new card; you may be asked to insert your Windows 95 installation CD-ROM or insert a floppy disk that came with the SCSI card.

Windows 95 should then sense your CD-R drive automatically and install the needed software. You may again be asked for your Windows 95 CD-ROM.

Once Windows 95 is started, confirm that everything's working in Device Manager (as shown above). Check that the drive can read a standard CD-ROM. Power down the PC and put its cover on.

Install the CD-R recording software. Follow the installation directions that came with your CD-R recording software.

Start recording CD-Rs. Most recording software lets you perform a test before you burn a disc—a good idea. Close all other programs before recording, and don't use your PC for another task until you're done.

If you have a hard drive with additional partitions, or a second hard drive, you may want to copy the data for your CD-R onto it. Some software also lets you choose a location for the "image" file the disc is made from. In that situation, use the extra partition or drive. In any case, remember to defragment all drives regularly.

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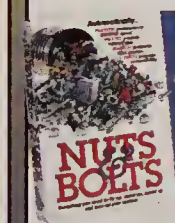

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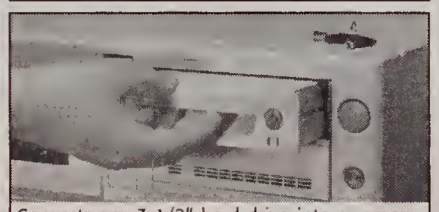

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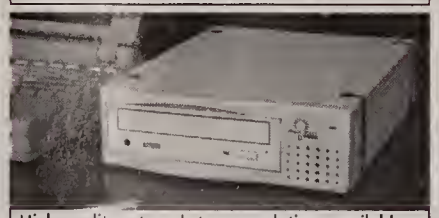

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4550MB	7200	Micropolis	MC4345WAV	$709
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45S0M8	7200	Quantum	XP34550W	$705
4550M8	10,000	Seagate	ST34501W	$825
9091MB	**5400**	**Micropolis**	**MC3391W**	**$1039**
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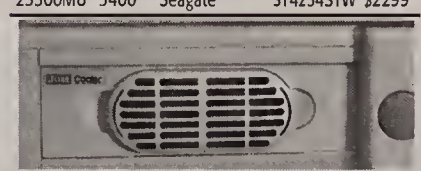
9100MB	7200	Seagate	ST19171W	$1069
9100MB	10,000	Seagate	ST19101W	$126S
23300M8	5400	Seagate	ST4234S1W	$2299



Hard Drive Cooling Fan Mounts in a 5 1/4 half height drive bay. Compatible with any 3 1/2" hard drive. Features twin cooling fans and a washable air filter. A must for 7200 and 10,000 RPM drives. (CHDFAN) $30

CD ROM DRIVES

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Speed	Brand	Model	ms	Int
12X	CyberDrive	CYBER12X	150	$79
16X	Toshiba	XM60028	90	$87
16X	Mitsumi	CRMCFX16X	120	$92
16X	NEC	CDR1600	100	$89
18X	Acer	AC616A	120	$92
20X	Lite On	LTN202A	120	$8B
24X	**Delta**	**DELTA24X**	**99**	**$89**
24X	Panasonic	CR585	85	$104
24X	Mitsumi	CRMCFX24X	90	$109
24X	Toshiba	XM61028	85	$115

IDE CD CHANGERS

Speed	Brand	Model	# Disks	Int
6X	NEC	CDR4X6	4	$89
BX	NEC	CDR4X8	4	$105
12X	Panasonic	SQTC512N	5	$266

ACCESSORIES

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Creative Labs Sound Blaster AWE64 (SB64AWE) $100
Creative Labs Sound Blaster AWE64 (SB64AWEGOLD) $180
Professional speakers with 8ose style swivel speakers and separate subwoofer.
2S Watt (SPEAKERJR) $99 3S Watt (SPEAKERPRO) $129
Universal sound cable(AUDIOMIX) $9
Turn any IDE CD ROM into an external for parallel printer port (PPCASECD) $89
Turn any IDE CD ROM into an external for PCMCIA port (PCMCIACASECD) $189

SCSI CD ROM

Speed	Brand	Model	ms	Int
12X	Toshiba	XM5701B	115	$139
12X	Plextor	PX12TS(tray)	105	$209
12X	Plextor	PX12CS(caddy)	10S	$2S9
15X	Toshiba	XM3801B	99	$159
16X	NEC	CDR1610	100	$149
20X	Plextor	PX20TS	95	$229

SCSI CD CHANGERS

Speed	Brand	Model	# Disks	
4X	Pioneer	DRM624X	6	(ext) $419
16X	Nakamichi	MJS16	5	$239

SCSI CD TOWERS			4 Drive	7 Drive
15X	Toshiba	99ms	$999	$1729
16X	NEC	100ms	$929	$1659
20X	Plextor	95ms	$1399	$2499

SCSI CD TOWERS w/ 5 Disc Changers
Nakamichi 16X 150ms $1399 $2399
Ethernet adapter option available. Call.

CD RECORDERS

Sony 2x6
Internal SCSI drive (CDU926S) $309*
Yamaho 4x6
Internal SCSI drive tray load (YCDR400T) $619*
Internal SCSI drive caddy load (YCDR400) $649*
Philips 2x6
Complete kit includes software, and 1 disk
Internal SCSI (CDD2600) $399
Hewlett Packard SureStor 6020I
SureStor 6020I includes software, and 1 disk
Internal SCSI (C4343CDR) $369
Complete internal kit w/ controller (C4343CDR-1) $409
External for parallel printer port (C434SA) $545
Sony 2x8
Internal IDE (CDU928S) $349*
Kit w/ 1 disk, and software compatible with Win 95 & Win NT 3.51 & up. Req IDE controller. (CDU92BSKIT) $369
Mitsumi 2x6
IDE Kit includes 3 disks, and software compatible with Win 95 & Win NT 3.51 and up. Requires IDE controller.
Internal (CRMC2600TE) $415
*Drive must be purchased with CDR software or media.

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17S0M8	10ms	S400	MP3017U	3	$167
2620MB	10ms	S400	MP3026U	3	$193
3500MB	10ms	5400	MP3035U	3	$214
4370MB	10ms	S400	MP3043U	3	$247
S2S0MB	10ms	S400	MP3052U	3	$314
QUANTUM					
1614MB	10ms	S400	FB31620A	3	$170
21S1M8	10ms	S400	FB32160A	3	$181
322BM8	10ms	5400	FB33240A	3	$212
4310MB	10ms	5400	FB34320A	3	$2S9
6448MB	10ms	S400	FB36480A	3	$3S7
MAXTOR					
7000MB	10ms	S200	M87000A	3	$439
SEAGATE					
2111M8	12ms	4500	ST32122A	3	$177
3227MB	12ms	4500	ST33232A	3	$214
4303MB	12ms	4S00	ST34342A	3	$262
WESTERN DIGITAL					
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5160MB	12ms	S400	AC3S100	3	$365

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7-14Gig	8mm, 120MB/min, ELIANT820	$1529
7-14Gig	Bmm, 60M8/min, EX8B700LT	$679
7-14Gig	8mm, 60MB/min, EXB8700	$919
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20-40Gig	8mm, 360MB/min, EXBB900	$3679
70-140Gig	8mm, 60MB/min, EXB10H	$4239

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12-24Gig	DDS-3 DAT, 132MB/min, STD224000N	$1059
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4-BGig	DDS-2 DAT, 90MB/min, SDT7000AI	$759
12-24Gig	DDS-3 DAT, 144MB/min, SDT9000AI	$1039
32-64Gig	DDS-2 DAT, 90MB/min, TSL7000X	$2099

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1.3G8 1024K	[TJ1.3]	$33	$31	$29
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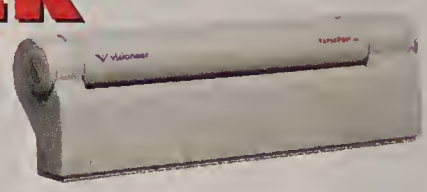

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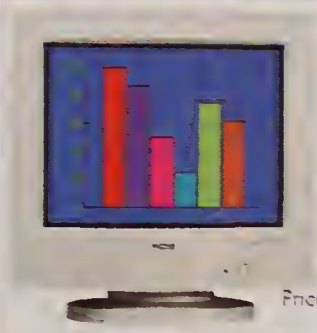

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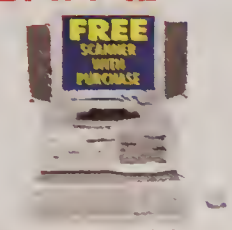

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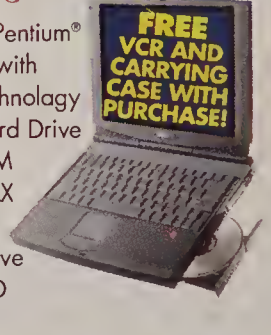

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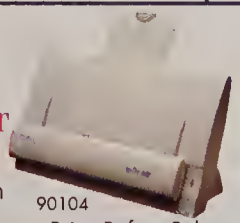

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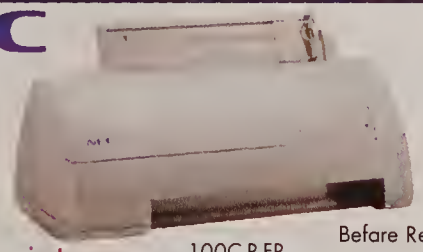

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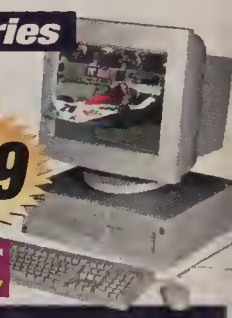

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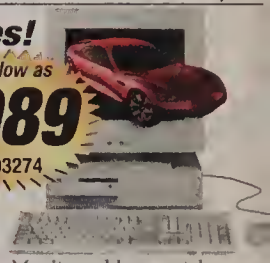

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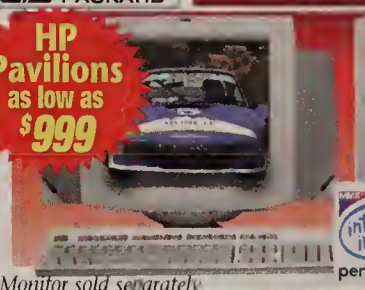

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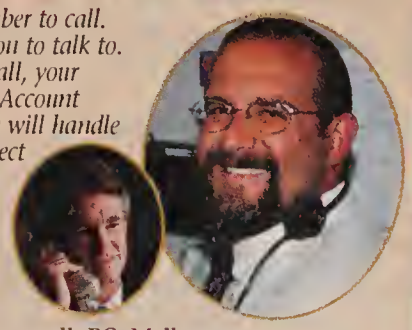

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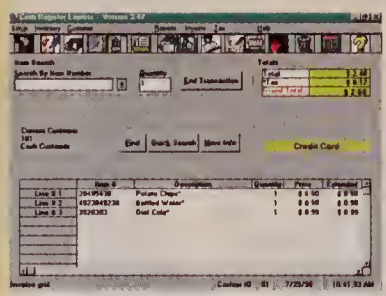

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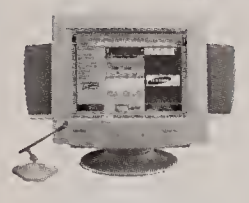

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440CDT 5/133 MMX 16MB 1.34GB
12.1" active 10X CD 2799.55
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12.1" active 10X CD 3659.16
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11.3" active 10X CD 3899.63
Tecra notebooks
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12.1" active 10X CD 4159.45
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740CDT 5/166 MMX 16MB 3GB
13.3" active 10X CD 4659.23
740CDT 5/166 MMX 16MB 3GB
13.3" active 10X CD 4849.62
Infinia mini-towers
7161 5/166 MMX 32MB 2.38GB 12X CD ... 1649.89
7201 5/200 MMX 32MB 3GB 12X CD ... 1989.24
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Aptiva C Series (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	24/42/79/149
Aptiva M Series	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC 330 Models 6571-6576	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC 330 Model 6577 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC 340 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC 350 Models 6581-6585	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC 350 Model 6586 (pairs)	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC 350 Model 6587 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC 360	4Meg/8Meg/16Meg/32Meg	37/57/69/159
PC 730 Models 6875-6876 (pairs)	4Meg/8Meg/16Meg/32Meg	37/57/69/159
PC 730 Model 6877 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC 750 Models 6885-6886 (pairs)	4Meg/8Meg/16Meg/32Meg	37/57/69/159
PC 750 Model 6887 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	24/42/79/149
PC Server 310 (pairs)	4Meg/8Meg/16Meg/32Meg	37/57/69/159
PC Server 500 (ECC, pairs)	4Meg/8Meg/16Meg/32Meg	59/79/119/249
P/S 1, 30 Pin Simms	1Meg/4Meg	12/34
P/S 1, 72 Pin Simms	4Meg/8Meg/16Meg/32Meg	37/57/69/159
P/S 2, 55SX, 65SX	4Meg	49
P/S 2, 53, 53LS, 56, 57	4Meg/8Meg	39/69
P/S 2, 95XP (ECC, pairs)	4Meg/8Meg	49/79
P/S 2 Server, 95, 195, 295 (ECC, pairs)	4Meg/8Meg/16Meg/32Meg	59/79/119/249

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IBM NOTEBOOK & LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Thinkpad 340, 345, 355, 360, C, CE	4Meg/8Meg/16Meg	49/79/139	129.00
Thinkpad 365C, CS, CD, E, ED	4Meg/16Meg	39/119	129.00
Thinkpad 365X, 365XD	8Meg/16Meg/32Meg	59/119/269	129.00
Thinkpad 380, 360D, 385D	8Meg/16Meg/32Meg64Meg	70/139/230540	129.00
Thinkpad 500, 510CS	4Meg/8Meg/16Meg	59/79/139	
Thinkpad 560, 560E	8Meg/16Meg/32Meg/64Meg	59/119/269/529	
Thinkpad 700, 720, 750, CL57SX	4Meg/8Meg/16Meg/32Meg	39/79/159/268	179.00
Thinkpad 701, 701C, 701CS	4Meg/8Meg/16Meg/32Meg	39/64/119/209	109.00
Thinkpad 730T, TE	4Meg/8Meg/16Meg	49/89/139	
Thinkpad 755C, CE, CD, CS	4Meg/8Meg/16Meg/32Meg	39/79/129/259	159.00
Thinkpad 760C, CD, L, LD	4Meg/8Meg/16Meg/32Meg	39/89/119/290	159.00
Thinkpad 760E, ED, EL, ELD	8Meg/16Meg/32Meg	59/119/260	159.00
Thinkpad 760XD, 760XL	8Meg/16Meg/32Meg/64Meg	79/129/279/549	
Thinkpad 765D, 765L	8Meg/16Meg/32Meg64Meg	79/129/279/549	

COMPAQ MEMORY MODULES

Deskpro 486/25, 33L, 50L	2Meg/8Meg/32Meg	29/79/199
Deskpro 3/25I, 33I, 4/25IS, 66I	2Meg/4Meg/8Meg	39/69/89
Deskpro 386, 486 M Series	2Meg/4Meg/8Meg	29/39/69
Deskpro M Series Expansion Board	0K (no memory)	119.00
Deskpro 450, 4100, 575, 590, 5100, 5133	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Deskpro 575, 5120, 5133, 5150, 5166 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Deskpro 2000, 4000, 6000 Series (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Deskpro 5/60M, 5/66M, XE560 (quads)	2Meg/4Meg/8Meg/16Meg/32Meg	39/49/69/139/239
Deskpro XL (pairs)	4Meg/8Meg/16Meg/32Meg	49/69/139/239
Deskpro XL 5150, 6200 (ECC, pairs)	8Meg/16Meg/32Meg/64Meg, 128Meg	Call
Deskpro 2000, Presario 4112, 4122, 4712, 4716, 5526, 5528	1Meg Video	69
Presario 5536, 9232, 9234, 9240, 9250, 9260, 9642, 9660	1Meg Video	69
Presario 510, 520, 524, 660, 720, 724, 860	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Presario 920, 924, 954, 974, 978, 992	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Presario 833, 850, 860, 866	4Meg/8Meg/16Meg/32Meg	39/64/119/239
Presario 5528, 7110, 7152	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Presario 7170, 7180, 9536, 9546, 9548, 9564 (pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Presario 9232, 9234, 9240, 9250, 9642, 9660 (pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Prolant 1000 5/60, 2000, R, 4000, R (quads)	4Meg/8Meg/16Meg/32Meg	36/62/99/189
Prolant 1500, 1500R (pairs)	4Meg/8Meg/16Meg/32Meg	36/62/99/189
Prolant 4500, 4500R (quads)	4Meg/8Meg/16Meg/32Meg/64Meg	39/64/119/230/599
Prolant 5000, 5000R (pairs)	32Meg/64Meg/128Meg/256Meg	Call
Prolinea 4/25S, 4/33, 4/66	2Meg/4Meg/8Meg	29/39/69
Prolinea (enhanced), MT	4Meg/8Meg/16Meg/32Meg	34/57/89/159
Prolinea 575, 590, 5100, 5120, 5133 (pairs)	4Meg/8Meg/16Meg/32Meg	34/57/89/159
Prolinea 5100, 5120, 5133, 5150, 5166 (EDO pairs)	4Meg/8Meg/16Meg/32Meg	34/57/89/159
Prolinea 575C, 590E, 120E, 575MX (pairs)	4Meg/8Meg/16Meg/32Meg	34/57/89/159
Prolinea 590MX, 5120MX (pairs)	4Meg/8Meg/16Meg/32Meg	34/57/89/159
Prolinea 6150E, 6180E (pairs)	8Meg/16Meg/32Meg	69/119/239
Prosignia 300 5/75, 5/90, 5/120, 5/150 (pairs)	4Meg/8Meg/16Meg/32Meg	34/57/89/159
Prosignia 500 5/90, 5/120, 5/150 (pairs)	4Meg/8Meg/16Meg/32Meg	34/57/89/159

COMPAQ NOTEBOOK/LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Thinkpad 349, 345, 355, 360, C, CE	4Meg/8Meg/16Meg	40/79/139	119.00
Armada 1100, 1120T, 1120, 1125	8Meg/16Meg/32Meg/64Meg	69/129/229/549	
Armada 1130, 1130T (pairs)	4Meg/8Meg/16Meg	49/69/129	
Armada 1510DM, 1520DM, 1550DMT	16Meg/32Meg/64Meg	139/239/579	
Armada 4100, 4110, D, 4120, T, 4130T, 4131T	8Meg/16Meg/32Meg	69/129/239	
Armada 7710MT, 7730MT, 7750DMT	16Meg/32Meg/64Meg	139/239/579	
Concerto 4/25, 433	4Meg/8Meg/16Meg	49/70/124	139.00
Contura 4/25, 4/25C, 4/25CX	4Meg/8Meg/16Meg	49/79/129	109.00
Contura 400C, 400CX, 410C, 410CX	4Meg/8Meg/16Meg	49/79/134	109.00
Contura 420C, 420CX, 430C, 430CX	4Meg/8Meg/16Meg/24Meg	49/79/134/199	109.00
Contura Aero	4Meg/8Meg/16Meg	39/79/139	109.00
LTE 5000, 5100, 5200, 5300	8Meg/16Meg/32Meg/64Meg	69/120/249/460	139.00
LTE Elite 440C, CX, 4/75CX	4Meg/8Meg/16Meg/24Meg	49/69/139/199	139.00
LTE Lite 425	4Meg/8Meg/16Meg	49/70/136	105.00
Presario 1000, 1910, 1020, 1030, 1070, 1080	8Meg/16Meg/32Meg	59/119/229	119.00

DELL MEMORY

Dimension XPS M166S, M200, P133s, 166s, 200s, P133v, 166v, 200v	8Meg/16Meg/32Meg	55/99/199
Dimension XPS P60, P75, P90, P100 (pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Dimension XPS P100c, 120c, 133c, 166c, XPS P75T, 100T (pairs) FPM or EDO	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Dimension XPS Pro 150, Pro 200 (quads)	4Meg/8Meg/16Meg/32Meg	39/69/102/209
Dimension XPS Pro 150n, 180n, 200n (Edo pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Optiplex GL, GM, GMT (Edo pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Optiplex GS, GXL, GXM, GXMT (Edo pairs)	4Meg/8Meg/16Meg/32Meg	24/42/69/139
Optiplex GXI, GXpro, 6180, 6200 (Edo, Ecc)	16Meg/32Meg/64Meg/128Meg	119/229/469/999
PowerEdge 2100, 4100 (Edo, Ecc)	16Meg/32Meg/64Meg/128Meg/256Meg	119/224/469/999/2499

LASER PRINTER MEMORY UPGRADES

AMOUNT UPGRADED	OK 8d	256k	1	2	3	3.5	4	5	6	8	16	32
Brother 630, 631, 641, 645	–	–	39	59	–	–	–	–	–	–	–	–
Canon LBP 430	–	–	19	–	–	–	49	–	–	–	–	–
Canon LBP 860, 1260	–	–	–	19	–	–	49	–	–	79	99	179
Canon LBP4, 4Lite, 4plus	–	–	129	179	–	–	–	–	–	–	–	–
Epson Action Laser 1100, 1600	–	–	19	29	–	–	49	–	–	89	109	–
Epson Action Laser II	–	–	74	–	130	–	–	180	–	–	–	–
Epson 8000, 1800, 4000, 4100, 4300	–	–	89	–	130	–	–	180	–	–	–	–
Epson 1000, 1500, 5000, 5200	–	–	–	49	–	–	98	–	–	–	–	–
HP 2, 2D	–	–	–	59	–	–	79	–	–	–	–	–
HP 3, 3D, 3P, 2P 2P+	–	–	–	59	–	–	79	–	–	–	–	–
HP 4, 4M, 4Si, 4SiMX	–	–	–	19	–	–	49	–	–	79	–	–
HP 4P, 4PLUS, 4MPm 1600, 1600CM	–	–	9	19	–	–	39	–	–	79	99	179
HP 4L	–	–	29	–	–	–	–	–	–	–	–	–
HP 3Si	–	–	9	–	–	–	39	–	–	79	–	–
HP 5L, 6L, 6LXi	–	–	–	–	–	–	49	–	–	99	–	–
HP 5P, 5MP, 4V, 4MV, 6P, 6MP	–	–	9	19	–	–	39	–	–	79	99	179
HP Design Jet 600, 650, 200	–	–	–	19	–	–	39	–	–	79	109	169
HP Design Jet 700, 750C Plus	–	–	–	–	–	–	29	–	–	49	89	179
HP Deskjet 500, 500C, 519, 550,560	29	–	–	–	–	–	–	–	–	–	–	–
HP Deskjet 1200C, 1200C/P	–	–	–	39	–	–	49	–	–	89	–	–
HP Paintjet XL300	54	–	–	–	–	–	69	–	–	144	299	–
IBM Laser 4019, 4019E	–	–	–	–	–	109	–	–	–	–	–	–
IBM Laser 4029, 4037	–	–	–	–	–	–	49	–	–	–	–	–
IBM Laser 4039, 4079	–	–	–	39	–	–	69	–	–	99	–	–
Lexmark Medley 4C, 4x, 4SX	–	–	Call	Call	Call	–	–	–	–	–	–	–
Lexmark, Optra L, LX, R, RX	–	–	–	–	–	–	39	–	–	69	99	199
Lexmark Valuwriter 300,600	–	–	29	39	–	–	89	–	–	–	–	–
Lexmark Winwriter 200, 400, 600	–	–	29	39	–	–	89	–	–	–	–	–
NEC 90, 290	–	–	–	89	–	–	–	–	–	–	–	–
NEC 95, 97	–	–	–	59	–	–	–	–	–	–	–	–
Oki 400	–	–	–	59	–	–	–	–	–	–	–	–
Oki 400E, 400EX, 410E, 410EX	–	–	67	89	169	–	189	–	–	–	–	–
Oki 810E, EX, 600E, EX, 610E, EX	–	–	29	79	–	–	119	–	–	149	229	–
Oki 830, 840	–	–	–	59	–	–	–	–	–	–	–	–
Panasonic 4420/4450I	–	–	–	79	–	–	109	–	–	–	–	–
Panasonic 4410/4430	–	–	–	59	–	–	99	–	–	–	–	–
Panasonic 4450	–	–	89	–	–	–	–	–	–	–	–	–
Panasonic 4400/5400	–	–	49	69	–	–	109	–	–	–	–	–
Panasonic 4440, 5410	–	–	69	–	–	–	109	–	–	–	–	–
Panasonic 6500	–	–	14	29	–	–	69	–	–	–	–	–
Sharp 9400, 9460, 9600, 9700E	–	–	49	69	–	–	119	–	–	–	–	–
Sharp 9500, E, H, 9700, H	–	–	49	–	–	–	236	–	–	–	–	–

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Compaq Aero, 400, 410, 420, 430	109	Sharp 8700, 8800, 8900	129
Compaq LTe 5000 Series	139	TI Exstensa 450, 455, 510, 515	139
Epson Action Note 650, 660	119	TI Exstensa 550, 555, 560, 570	149
Epson Action Note 800, 866, 880, 910	119	TI Exstensa 600, 605, 650	169
IBM Thinkpad 355, 360	119	Toshiba 400, 405, 410, 415, 420, 425, 430 (NIMH)	219
IBM Thinkpad 365 C, ED, XD	129	Toshiba 100, 105, 110, 115, 200, 205	105
IBM Thinkpad 701	109	Toshiba 2100 Series	99
IBM Thinkpad 750, 755	179	Toshiba 2400, 2450, 1900, 1950, 1960	109
IBM Thinkpad 755 CD, CE, CV, CX	179	Toshiba 4700, 4800, 4850, 4900	109
NEC Versa 2400, 2405, 2430, 2435	159	Toshiba T4500, T4600	159

TOSHIBA LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Libretto 50CT	8Meg/16Meg/32Meg/48Meg/128Meg	69/118/229/369/1049	
Dynapad T200, T200CS		Call	
Tecra 500CDT, CS, 510CDS, CDT	8Meg/16Meg/32Meg/48Meg/128Meg	69/118/243/Call/Call	
Tecra 520CDT, 530CDT	8Meg/16Meg/32Meg/48Meg/128Meg	69/118/243/Call/Call	
Tecra 700CS, 700CT (SDRAM)	8Meg/16Meg/32Meg	79/129/229	
Tecra 710CDT, 720CDT, 730CDT	8Meg/16Meg/32Meg/64Meg/128Meg	79/129/239/539/1079	
Tecra 730XCDT, 740CDT	8Meg/16Meg/32Meg/64Meg/128Meg	79/129/239/539/1079	
T2000SXE	8Meg	94	170.00
T2100 Series	4Meg/6Meg/16Meg/24 Meg	39/50/110/180	119.00
T1900, T4500, T4600, T4700, T4900 All Models	4Meg/8Meg/16Meg/32Meg	39/79/129/239	199.00
T2400, T3499, T3400CT, T3600	4Meg/8Meg/16Meg	49/69/119	119.00
Satellite T100CS, 105CS, 110CS, 110CT, 115CS	8Meg/16Meg/32Meg	74/129/230	110.00
Satellite 200CDS, 205CDS Series	8Meg/16Meg/32Meg	79/129/230	119.00
Satellite 220CDS	8Meg/16Meg/32Meg/48Meg/128Meg	79/129/249/369/1079	
Satellite T400 Series, T600 Series	8Meg/16Meg/32Meg	79/129/230	220.00
Portege 300	16Meg/32Meg	129/239	
Portege 610CT, 620CT, 650CT, 660CT	8Meg/16Meg/32Meg/64Meg	79/139/249/539	

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
ACERNote 730C, 735C, 760C, 760CX, 780CX	4Meg/8Meg	59/80	129.00
ACERNote 763, 765, 782, 784, 786	4Meg/8Meg/16Meg	39/69/110	
ACERNote Light 350, 352, 355	4Meg/8Meg/16Meg	40/69/129	179.00
ACERNote Light 356, 358, 350, 361 (pairs) edo	4Meg/8Meg/16Meg	49/69/129	179.00
ACERNote Nuovo 971, 972, 372, 373, 374	8Meg/16Meg/32Meg	69/125/239	
ACERNote Pro 950, 954, 955, 057, 959 (pairs)	4Meg/8Meg/16Meg	59/79/129	
Ambra SN Series	4Meg/16Meg	69/149	129.00
Ambra N-75, N-190	4Meg/8Meg/16Meg	40/79/139	139.00
AST Ascentie A41, A42	8Meg/16Meg/32Meg/64Meg	79/130/269/629	179.00
AST Ascentia P30, P50	8Meg/16Meg/32Meg	79/149/269	
AST Ascentia J10, J30, J50 (pairs)	8Meg/16Meg/32Meg/64Meg	79/129/249/359	
AST Ascentie 800N, 610N, 900N, 910N	8Meg/16Meg	70/120	120.00, 105.00
AST Ascentia 950N	8Meg/16Meg	79/139	190.00
AST Bravo & Explorer	4Meg/16Meg	79/139	155.00
AT&T Globalyst 130, 200, 250	4Meg/8Meg/16Meg	40/79/119	139.00
Austin DX4, DX2, SX2, SX Series	4Meg/16Meg	69/189	159.00
Austin Edge CD P-133 edo	8Meg/16Meg	89/149	
Austin Edge Duet (pairs) edo	16Meg/32Meg	79/139	
Austin Vista	4Meg/8Meg/16Meg/24Meg	49/79/139/199	
Canon 1190, 309P (pairs)	4Meg/8Meg/16Meg	50/79/120	120.00
Canon Innova Book 150, 175	4Meg/16Meg	59/139	129.00
Canon Innova Book 200LS	4Meg/8Meg/16Meg/24Meg	59/89/179/249	
Canon Innova Book 350CD, 360, 475	8Meg/16Meg	59/119	
Canon Innova Book 480, 490 edo	8Meg/16Meg	69/119	139.00
CTX EZ Book 500, 600, 700 Pent, Series	4Meg/8Meg/16Meg	59/89/119	
DEC HiNote	4Meg/8Meg/16Meg	59/89/139	129.00
DEC HiNote Ultra, Ultra II	4Meg/8Meg/16Meg	39/69/119	
DEC HiNote VP 520, 525, 535, 545 (pairs)	4Meg/8Meg/16Meg	39/69/119	
DEC HiNote VP 5100, 5120	8Meg/16Meg/32Meg/64Meg	69/119/219/669	
DEC HiNote VP, Css, LSS, CTS, LTS	8Meg/16Meg/32Meg/64Meg	69/119/219/669	
Dell Latitude LM (pairs)	4Meg/8Meg/16Meg	39/69/129	
Dell Latitude 433, C, CX	4Meg/16Meg	59/129	
Dell Latitude LX, M	4Meg/8Meg/16

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4150 Pentium® Processor 150MHZ MMX 16/1.4GB 33.6K, 10X CD 12.1" HASTN $2499
4360X Pentium® Processor 166MHZ MMX 16/2.1GB 33.6K, 10X CD 12.1" TFT $3499

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IBM760XL Pentium® Processor 166MHZ MMX 16/2.1GB 12.1" TFT $3935
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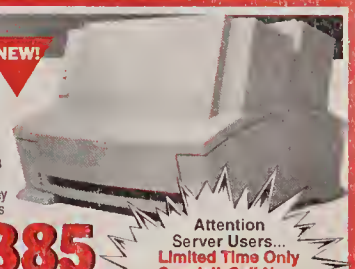

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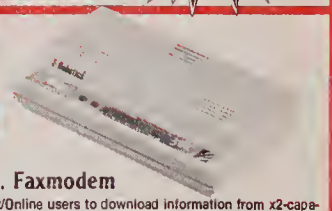

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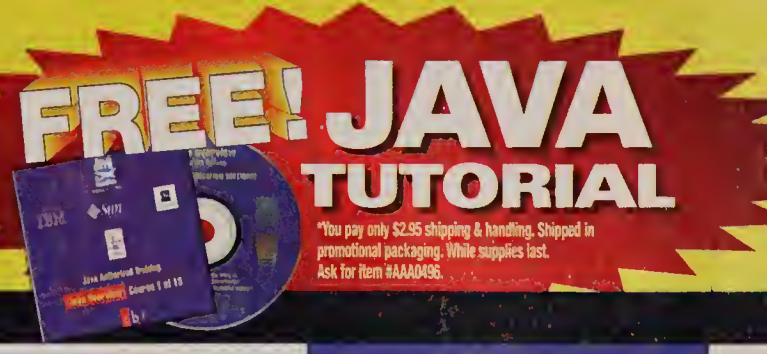

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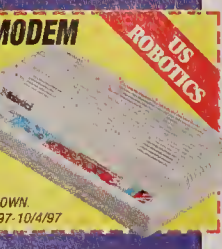

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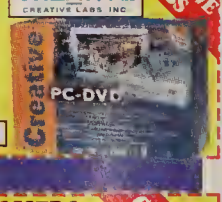

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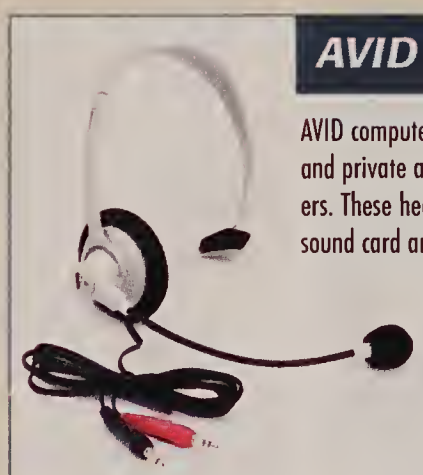

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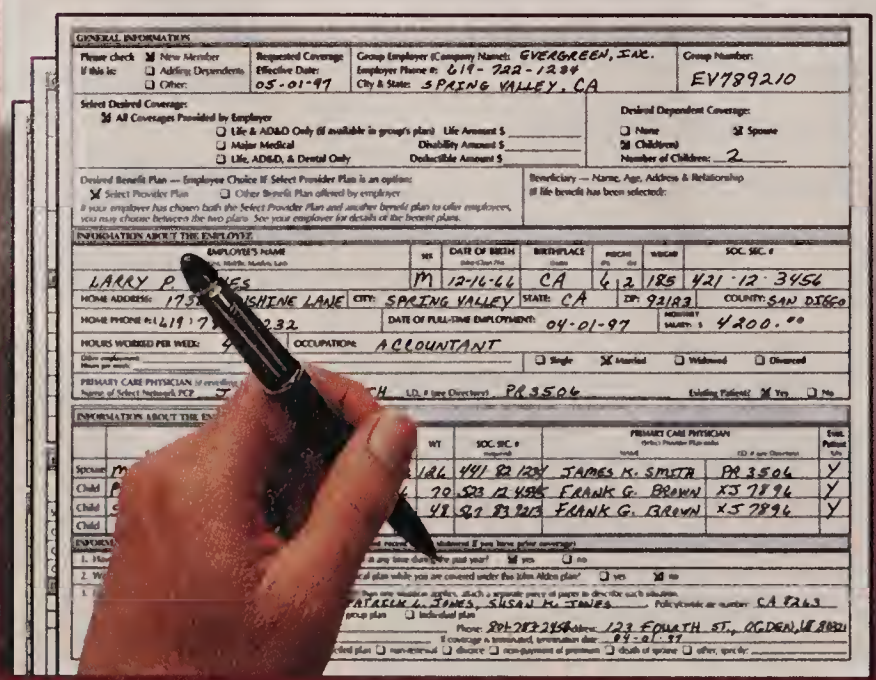

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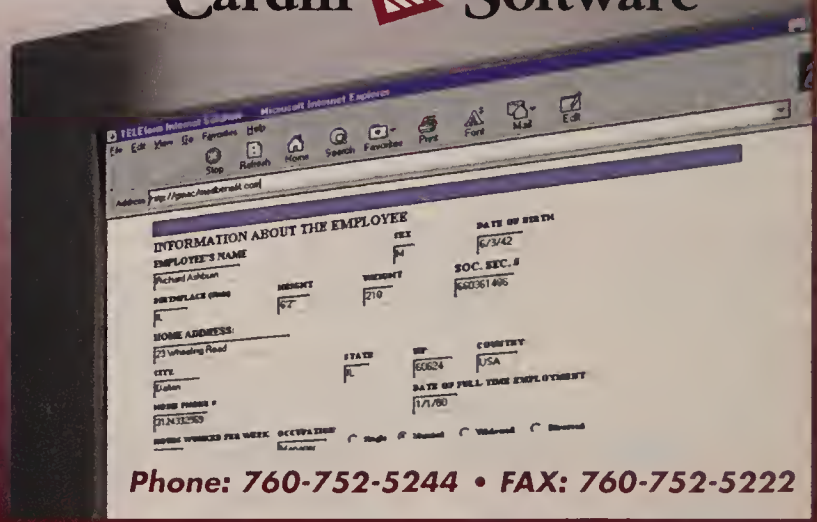

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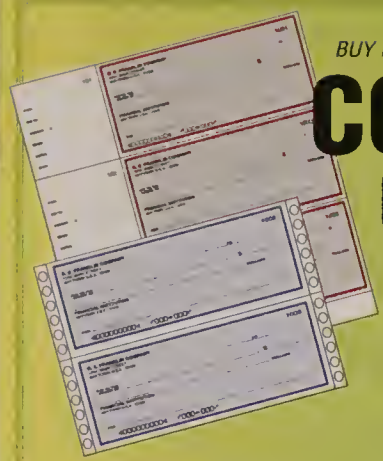

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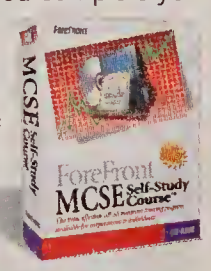

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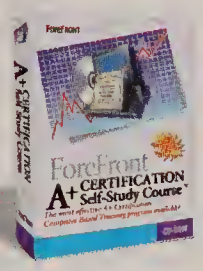

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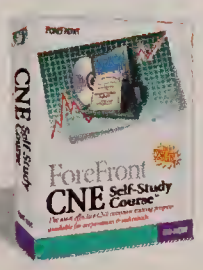

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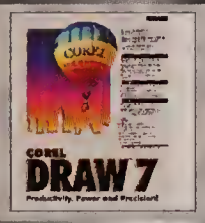

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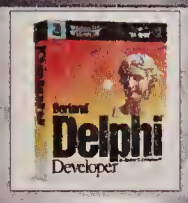

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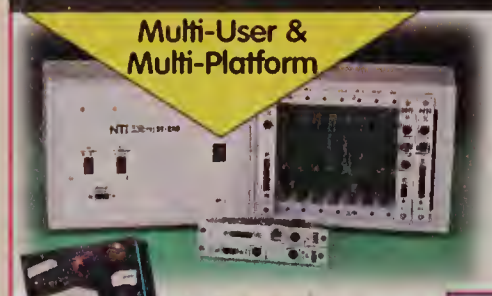

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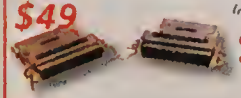

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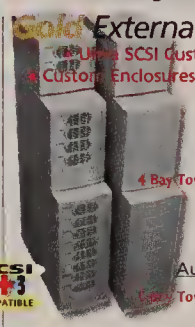

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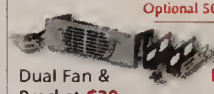

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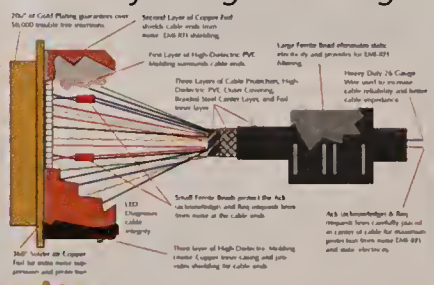

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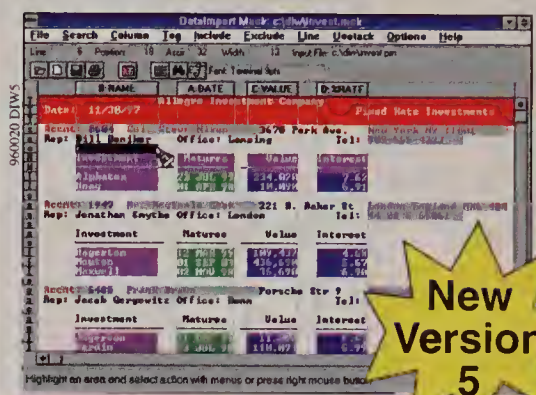

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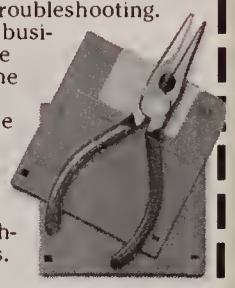

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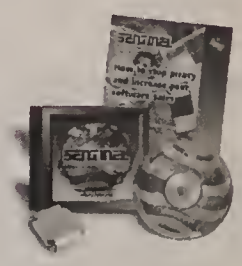

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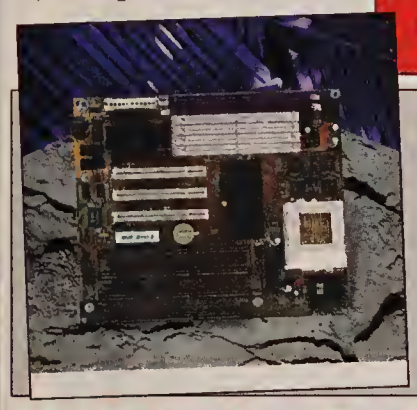

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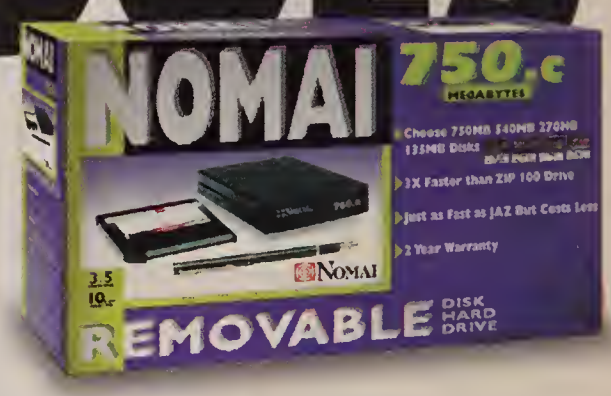

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Speech Recognition: Now You're Talking!

TALK TO MY COMPUTER? I do it all the time, usually in words I can't print here. Dictate to my computer and have it recognize what I say? Until recently I'd have scoffed, "Forget it. That's Star Trek. It won't happen until well into the twenty-first century." But it just did.

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Still, my wish list has plenty of items. For one, the software can't punctuate sentences on its own. You have to dictate punctuation marks ("comma"), ending every sentence with "period." You can hardly complain, since executives used to do this back in the age of the Dictabelt, but having the program make a stab at punctuation would keep the train of thought moving down the track.

SPEAK AND SPELL

IT'S ALSO OBVIOUS that speech-driven computers need a new kind of interface, one not designed to be used with a mouse or other pointing device. If we're going to speak to our computers, we'll need a command-driven interface that's closer to the "do-what-I-mean" ideal.

Good as it is at recognizing words, the Dragon software demonstrates how limiting the current situation really is. To save a file, you say "click file" and then "click save." That's not horrible, but editing a block of text by voice or even just moving the cursor can be painfully complicated, largely because those processes are totally oriented toward mouse and keyboard.

In a command-driven system, fewer words might accomplish more. Commands that do specific things wouldn't have to be mapped to goofy key combinations like <Ctrl>-<Backspace>. Dragon has a "delete character left" command that should simply be "backspace." If Dragon could understand commands like "move up one paragraph, delete 'in fact', and save the file," it would work more smoothly.

Microsoft recently demonstrated an early prototype of a word processor that had virtually no visible user interface. The screen was largely devoid of buttons, bars, and gizmos. But when a demonstrator typed something like 'letter to Sam Houston', the program responded with the proper letterhead format, Sam's address piped in from a database, and all the right salutations.

That's only a beginning. There are other possibilities, like hybrid systems that meld speech and gesture. Take that backspace command: Maybe it should be on a handheld clicker, along with backword, backsentence, and backparagraph keys. Mixing speech with other means of control could lead to powerful solutions.

Talking to our computers calls for entirely new ways of interacting with them. Mice? Keyboards? Our grandkids may look at these devices the way we look at hand-cranked phones.

PC World *contributing editor Stephen Manes is a columnist for the* New York Times *and coauthor of* Gates: How Microsoft's Mogul Reinvented an Industry *(Touchstone/Simon & Schuster, 1994, 800/223-2348).* ■

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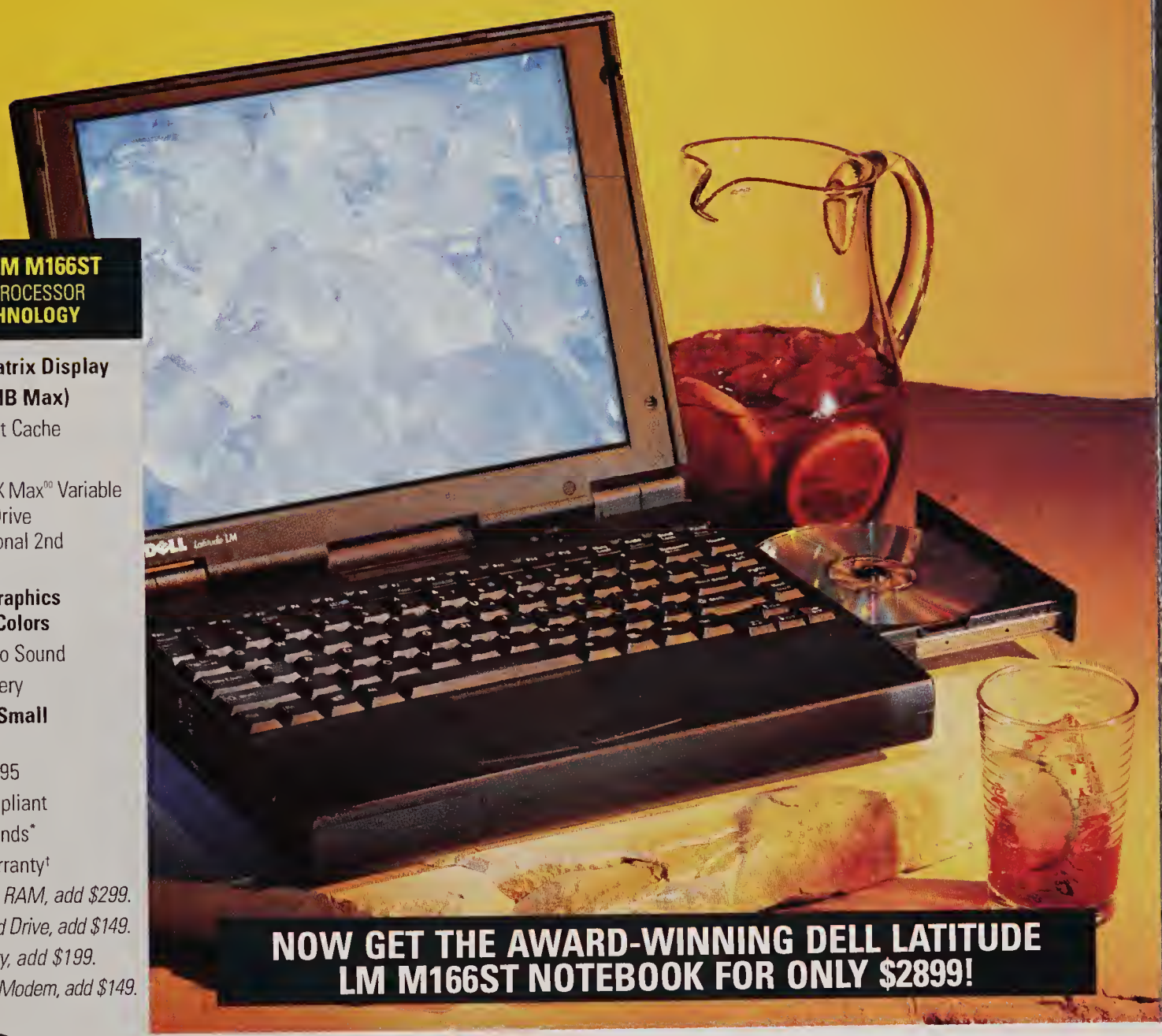

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Still, my wish list has plenty of items. For one, the software can't punctuate sentences on its own. You have to dictate punctuation marks ("comma"), ending every sentence with "period." You can hardly complain, since executives used to do this back in the age of the Dictabelt, but having the program make a stab at punctuation would keep the train of thought moving down the track.

SPEAK AND SPELL

IT'S ALSO OBVIOUS that speech-driven computers need a new kind of interface, one not designed to be used with a mouse or other pointing device. If we're going to speak to our computers, we'll need a command-driven interface that's closer to the "do-what-I-mean" ideal.

Good as it is at recognizing words, the Dragon software demonstrates how limiting the current situation really is. To save a file, you say "click file" and then "click save." That's not horrible, but editing a block of text by voice or even just moving the cursor can be painfully complicated, largely because those processes are totally oriented toward mouse and keyboard.

In a command-driven system, fewer words might accomplish more. Commands that do specific things wouldn't have to be mapped to goofy key combinations like <Ctrl><Backspace>. Dragon has a "delete character left" command that should simply be "backspace." If Dragon could understand commands like "move up one paragraph, delete 'in fact', and save the file," it would work more smoothly.

Microsoft recently demonstrated an early prototype of a word processor that had virtually no visible user interface. The screen was largely devoid of buttons, bars, and gizmos. But when a demonstrator typed something like 'letter to Sam Houston', the program responded with the proper letterhead format, Sam's address piped in from a database, and all the right salutations.

That's only a beginning. There are other possibilities, like hybrid systems that meld speech and gesture. Take that backspace command: Maybe it should be on a handheld clicker, along with backword, backsentence, and backparagraph keys. Mixing speech with other means of control could lead to powerful solutions.

Talking to our computers calls for entirely new ways of interacting with them. More Keyboards? Our grandkids may look at these devices the way we look at hand-cranked phones.

PC World contributing editor Stephen Manes is a columnist for the New York Times *and coauthor of* Gates: How Microsoft's Mogul Reinvented an Industry *(Touchstone/Simon & Schuster, 1994, 800/223-2348).* ■

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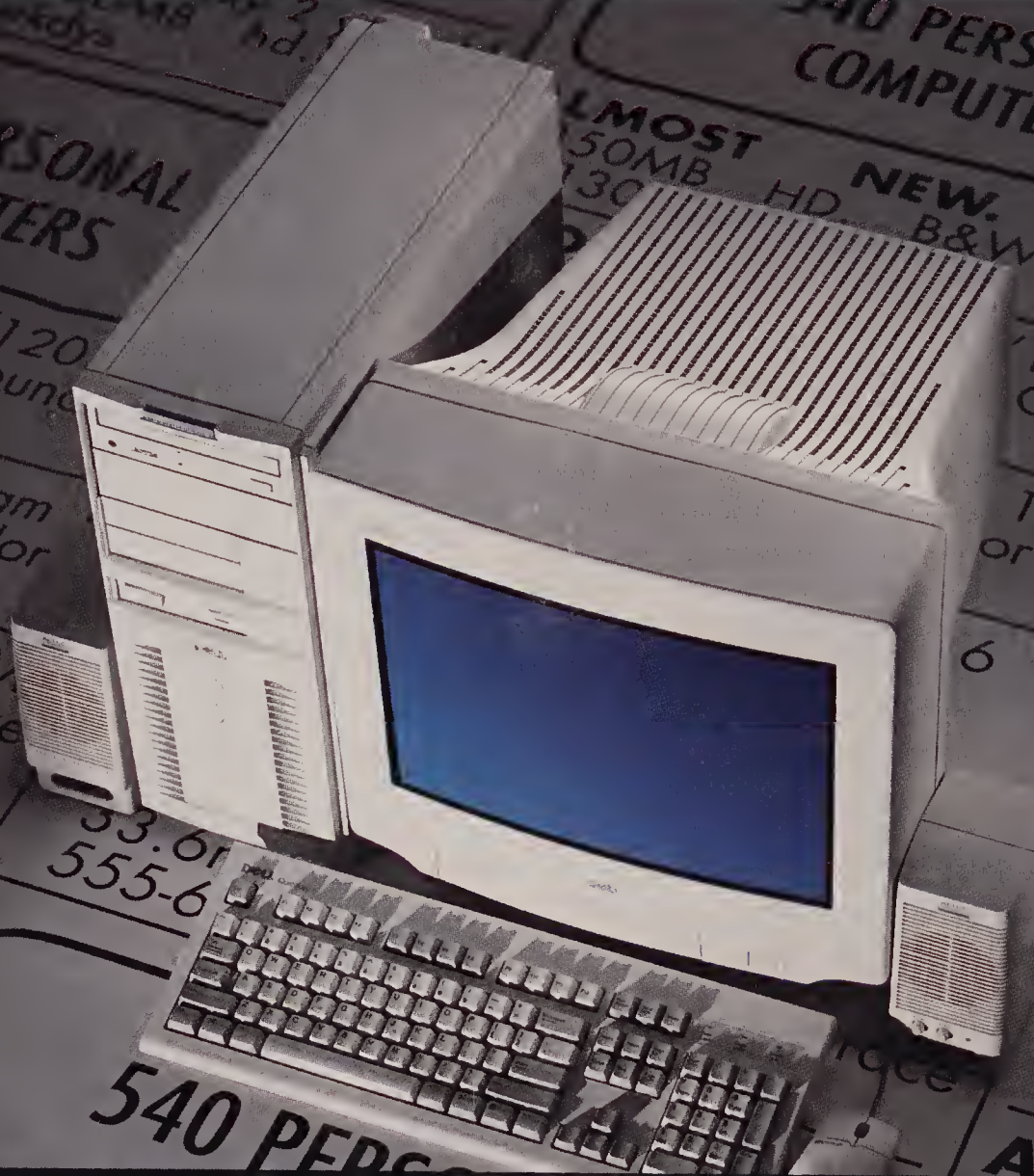

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